

SCHOOL OF CIVIL ENGINEERING



JOINT HIGHWAY RESEARCH PROJECT

JHRP-75-26

HISTORY OF THE INTERSTATE
SYSTEM IN INDIANA

VOLUME I - DEVELOPMENT OF
THE NATIONAL PROGRAM

David A. Ripple



PURDUE UNIVERSITY
INDIANA STATE HIGHWAY COMMISSION

Final Report

HISTORY OF THE INTERSTATE SYSTEM IN INDIANA

TO: J. F. McLaughlin, Director
Joint Highway Research Project
December 1, 1975
Project: C-36-64H

FROM: H. L. Michael, Associate Director
Joint Highway Research Project
File: 3-5-8


Attached is the Final Report titled "History of the Interstate System in Indiana", authored by David A. Ripple a Graduate Instructor on our staff while conducting the research and authoring the Report. Professor W. L. Grecco, formerly of our staff, directed the study during its initial year and Professor Michael supervised it during the latter years and handled the lengthy review process. The Report has been reviewed by several personnel of the ISHC, including Mr. Walter Frick, and changes suggested by them have generally been made and are sincerely appreciated.

The History covers the period from the late 1930's through 1972. The Interstate System was not yet complete in 1972 and the period after 1972 is not reported herein. Perhaps it will be at a later date after the System is completed.

The Report is voluminous and therefore is issued in four (4) volumes as follows:

- Volume I - Development of the National Program
(Chapters I thru IV)
- Volume II - Evolution of Policies and Standards
(Chapter V)
- Volume III - Route History
(Chapter VI)
- Volume IV - Cost, Funding and General Benefits
(Chapters VII and VIII)

Another volume as an Appendix which is a detailed Table titled "Interstate Highway Construction Record" is also in preparation and will be issued at a later date. A brief summary of the entire history is also in preparation.



Digitized by the Internet Archive
in 2011 with funding from
LYRASIS members and Sloan Foundation; Indiana Department of Transportation

Each of the Volumes covers a part of the History and may be used separately as each is complete for the topic or topics covered. The entire set of four volumes provides an excellent in-depth reference document of the Interstate System history in Indiana and should be extremely valuable for many purposes. To my knowledge Indiana is the first state to prepare such a factual detailed history of the Interstate System.

Sincerely,

Harold L. Michael

Harold L. Michael
Associate Director

HLM:ms

cc:	W. L. Dolch	M. L. Hayes	C. F. Scholer
	R. L. Eskew	G. A. Leonards	M. B. Scott
	G. D. Gibson	C. W. Lovell	K. C. Sinha
	W. H. Goetz	R. F. Marsh	L. E. Wood
	M. J. Gutzwiller	R. D. Miles	E. J. Yoder
	G. K. Hallock	P. L. Owens	S. R. Yoder
	D. E. Hancher	G. T. Satterly	

Final Report
HISTORY OF THE INTERSTATE HIGHWAY SYSTEM IN INDIANA
Volume I (Chapters I-IV)
DEVELOPMENT OF THE NATIONAL PROGRAM

by
David Alan Ripple
Graduate Instructor in Research

Joint Highway Research Project

Project No.: C-36-64H

File No.: 3-5-8

Joint Highway Research Project
Engineering Experiment Station
Purdue University

In Cooperation With
Indiana State Highway Commission

The contents of this Report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Indiana State Highway Commission or of the Joint Highway Research Project of Purdue University.

Purdue University
West Lafayette, Indiana
December, 1975

This dissertation is dedicated to those who conceived an interregional system of superhighways and to those who brought this concept into reality.

ACKNOWLEDGEMENTS

With a deep sense of gratitude, the author wishes to personally thank Dr. William L. Grecco, Head of the Department of Civil Engineering at the University of Tennessee, for his counsel in developing the work program for this study and in implementing the first critical phases of the study. He has kindled my continued interest in urban and transportation planning and our association was an unforgettable intellectual experience.

The ultimate task of reviewing this report fell to Professor Harold L. Michael, Head of the Urban and Transportation Engineering Department at Purdue University, who succeeded Dr. Grecco as major professor. During the compiling of the report, his guidance and constructive criticism were invaluable.

The participation of Dr. Gilbert T. Satterly, Jr., of the Urban and Transportation Engineering Department, Dr. Harvey H. Marshall, Jr., of the Department of Sociology, and Dr. David H. Root of the Department of Statistics in the review and critique of this research was most welcome.

The open cooperation of the Indiana State Highway Commission personnel in providing access to their files, in compiling data for portions of the report and in supplying information in extensive interviews was responsible to a large degree for the success of the research. The cooperation of the Indiana Division Office of the Federal Highway Administration and many other transportation related agencies throughout Indiana in providing additional information was invaluable.

The author also owes a debt of gratitude to the secretaries of the Joint Highway Research Project office who typed this report, the draft persons who constructed the illustrations, and his fellow students who offered encouragement and support for this research.

Not least, I acknowledge the unrepayable debt to Melinda, my wife, for reviewing the rough drafts of this report as well as providing continual moral support.

TABLE OF CONTENTS

	Page
LIST OF TABLES.	xvi
LIST OF FIGURES	xix
ABSTRACT.	xxvii
CHAPTER I - INTRODUCTION.	1
CHAPTER II - THE NEED FOR AN INTERSTATE HIGHWAY SYSTEM AND INTERSTATE SYSTEM GOALS	7
The Traditional Role of Transportation	7
Early Governmental Involvement in Transportation.	9
Governmental Involvement in Highway Transportation on a Continuous Basis.	12
The Need Arises.	13
Goals.	14
Notes.	17
CHAPTER III - DEVELOPING A PROGRAM.	18
Toll Roads and Free Roads.	19
The Future of Indiana Roads.	23
Highway Needs for National Defense	24
Planning the Interregional Highway System.	25
Interregional Highways	27
Background for Study.	29
The Recommended Interregional Highway System	31
Selection of Routes for the Inter- regional System.	35
Route Selection in Urban Areas.	40
Access Limitation	41
Acquisition of Rights-of-Way.	42
Design of the Interregional System.	43
Constructing the Interregional System	44
Financing the Interregional System.	45
Conclusion.	50

TABLE OF CONTENTS (Continued)

	Page
The First Completion Cost Estimate.	51
Status of Interstate Improvement	53
Correcting the Deficiencies.	56
Retrospect	58
More Studies.	59
The National Highway Study	59
DuPont's Informal Advisory Committee	60
Needs of the Highways from 1955 to 1984	61
Highway Inadequacy	62
Highway Improvement Estimate	64
Construction Needs for the First Ten Years.	65
Construction Needs for the Next Twenty Years	68
Construction Expenditure.	69
Maintenance and Administrative Needs and Expenditures	71
Total Needs and Expenditures.	72
Highway Improvement Financing.	72
Conclusion	75
The National Highway Program Study.	76
Program Recommendations.	78
Inadequacy of the Present Highway Network.	80
Cost of Modernization.	81
Financing the National Highway Program	84
Implementation of the National Highway Program	90
Report Conclusion.	91
Notes	92
CHAPTER IV - THE PROGRAM AND ITS EVOLUTION	94
Construction Time	95
Manpower.	97
Material and Equipment.	98
Financing in General.	98
Federal Highway Trust Fund	98
Highway Acts	100
Apportionment of Funds.	101
Federal Share	104
Use of Funds.	104
Interstate Use Restrictions	105
Administrative Policy	106
Right-of-Way Acquisition.	107
Inclusion of Toll Roads in the Interstate System.	108

TABLE OF CONTENTS (Continued)

	Page
Reimbursement for Completed	
Interstate Sections.	109
Other Provisions.	110
Indiana Motor Vehicle Fund	111
Notes	113
CHAPTER V - EVOLUTION OF POLICIES AND STANDARDS. . . .	114
Planning.	116
Criteria for Corridor Selection and	
Mileage Designation	116
Route Location Procedure	122
Location Criteria	122
Indiana's Route Location Process. . . .	127
Evolution of the Route Alternative	
Evaluation Process.	132
Criteria Used to Evaluate Alternatives.	132
Evaluation of Economic Analysis	
Techniques	134
Evolution of the Decision-Making Process . .	138
Overview of the Decision Making	
Process.	138
The Decision-Making Process in Indiana.	140
Evolution of the Review Process.	141
Public Participation and the Public	
Hearing Process.	144
Notice Offering Public Hearing . .	147
Notice of Public Hearing	149
Conduct of Hearing	151
Action on Transcript	154
Notice of Request for Approval . .	155
Notice of Project Approval	156
Other Changes in the Review Process . .	157
A-95 Review - Project Notification	
and Review System.	161
Design.	167
Evolution of Design Standards.	167
Influence of Forerunners on	
Interstate Design.	174
Interstate Design Standards	176
Change in the Design Year	177
Minimum Four-Lane Requirement	178
Evolution of Pavement Design.	179
Safety in Design.	183
Safety Provisions for Roadside	
Features and Appertenances. .	184

TABLE OF CONTENTS (Continued)

	Page
Evolution of the Interstate System Cross Section.	188
Evolution of Bridge Design	196
Traffic Control and Protection Devices	210
Considerations in Grade Treatment	211
Evaluation of Design Alternatives	213
Evolution of the Interchange	214
Interchange Location and Spacing.	215
External Factors	216
Internal Factors	219
Special Considerations	220
Interchange Justification.	224
Selection of Interchange Type	227
Interchange Design and Special Considerations	236
Other Design Features.	238
Evolution of the Separation	238
Evolution of Road Closure	241
Evolution of the Frontage Road.	242
Utilization of Collector-Distributor Roads.	243
Federal and State Policy As It Affects Design.	244
Policies on Grade Separated Crossroads Without Ramps.	244
Policies on Interchanges.	255
Policies on Other Roads	257
Policies on Additional Through Lane	260
Policies on Safety Improvements	262
Policy on Abandonment and Revision of Plans	266
Federal Aid Financing on Completed Sections of the Interstate System.	268
Flexibility in Design	269
The Role of Traffic Engineering in Interstate Design.	270
Other Functional Areas.	272
New Concepts	272
Joint Development	273
Multiple Use Development.	275
Environmental Emphasis.	277
The Environmental Impact Statement and the 4(f) Statement Processes	283
Content of Environmental Impact Statement	288

TABLE OF CONTENTS (Continued)

	Page
The Environmental Impact Statement Process in Indiana	293
Roadside Development	294
Evolution of Landscape Design	294
Landscaping and Scenic Enhancement.	296
Safety Rest Parks	299
Scenic Overlooks.	302
Scenic Strips	302
Control of Outdoor Advertising.	303
Control of Junkyards.	307
Land Acquisition	308
Evolution of the Land Acquisition Process.	309
The Practice of Land Acquisition.	312
Access Control.	315
Advance Land Acquisition.	316
Overview of Advanced Land Acquisition	317
Alternatives to Advanced Land Acquisition	320
Excess Condemnation	323
Relocation	325
General Relocation Policies and Procedures	326
Evolution of Relocation Process	333
Compensation for Losses	334
Losses Due to Direct Displacement.	335
Losses Due to Uncertainty or Delay	340
Indirect Losses in Surrounding Areas	341
Cooperation with Other Agencies	342
Utilities Relocation	342
Utility Relocation Procedures	343
Utility Accommodation Policies.	345
Specifications, Contracts and Bidding.	347
Specifications.	349
Contract Proposal	350
Notice to Contractors.	350
Special Provisions	350
Federal Provisions	351
Proposal	352
Bid Schedule	353
Bid Guarantee.	353
Contract	354
Bond	354

TABLE OF CONTENTS (Continued)

	Page
Bidding	354
Construction	355
Construction Policies and Procedures.	355
Evolution of Construction Technology.	357
Maintenance.	358
Interstate System Construction Priorities . . .	360
Notes	362
CHAPTER VI - ROUTE HISTORY	371
Prelude	372
Early Highway Acts	372
Designation of Interstate Mileage.	375
A Time of Study and Little Construction. .	379
The Interstate Program	382
Formulation of the Indiana Interstate System.	384
Indianapolis Metropolitan Area Interstates. . .	385
Background of the Indianapolis Interstates	387
Interstate Route 465	390
East Leg.	392
Relocation from Shadeland Avenue.	392
Comparison of the Revised Route with a Route Farther East .	394
Woolen's Gardens	396
Fall Creek Road and Fall Creek Parkway	399
Interchange of Interstate 465 and Interstate 70	400
North Leg	401
Lochner Location Study	402
Continued Opposition	408
Design Changes	411
West Leg.	413
South Leg	414
Interchanges	416
Lake Shore Golf Course	417
Interstate Routes Inside Interstate 465. .	417
Location Studies.	418
Inner Belt	418
West Route	422
South Route.	427
East Route	432
Northwest Route.	433
Additions and Alternatives to the Recommended Inner City Inter- state Freeway System	436
North Freeway.	440
Northeast Freeway.	440
Modified Plan.	446

TABLE OF CONTENTS (Continued)

	Page
Interstate Type West Leg for the Inner Belt.	449
Supplemental Freeways.	452
Design of the Inner City Interstate	
Freeway System	459
Depressed Versus Elevated.	459
Inner Belt Design.	461
North Leg Inner Belt Design.	463
Northeast Inner Belt Master Interchange	467
East Leg Inner Belt Design	468
Southeast Inner Belt Master Interchange	471
South Leg Inner Belt Design.	472
West Leg Inner Belt Design	473
West Route Design.	473
South Route Design	475
East Route Design.	476
Northwest Route Design	478
Public Interest	479
Public Hearings.	479
Continued Opposition	485
Indianapolis Metropolitan Area Interstates	
Outside Interstate 465.	488
Southport Road Controversy	488
Separation of 82nd and 86th Streets on Interstate 65 North	494
86th Street Separation on Interstate 69	496
Bridgeport Road Separation on Interstate 70 West	496
Interstate 70 East in Marion County	497
Interstate 74 Interchange at Clermont	498
Interstate Route 64	500
Shifting Corridors	502
Original Location Proponents.	503
Southern Route Proponents	504
Comparison of Route Alternatives.	505
Population Density	505
Population and Economic Growth	507
Service to Evansville and Crane Naval Depot	507
User Benefits.	508
Construction Cost.	509
Resolution of Events.	509
Southern Route Location Studies	511

TABLE OF CONTENTS (Continued)

	Page
Lynville Location Study.	512
Alternative Location Study from SR 57 to SR 45	512
Alternatives in the SR 61 Inter- change Area.	516
Alternatives near Warrick County Road 600 West.	518
Location Alternatives Between State Road 145 and State Road 64	518
Location of Interstate 64 in New Albany. .	521
Early Location Studies.	521
Reevaluation of the New Albany Location	525
Additional Interchanges.	528
Interstate Route 65	529
Jeffersonville	530
Interstate 65 Location Studies from Jeffersonville to Indianapolis. . . .	533
Alternatives from Jeffersonville to Seymour.	533
Alternatives from Seymour to Indianapolis	534
Interstate 65 South: Special Requests . .	542
Market Street Exit Ramps.	542
Memphis Interchange	547
Underwood Interchange	548
Jackson County.	549
State Road 44 Interchange	551
Interchange 65 Location Studies from Indianapolis to Gary.	553
Swanington to Gary Location Study . .	553
Lafayette	554
Wildcat Creek Reservoir	566
Interstate 65 North: Special Requests . .	571
Directional Sign to Whitestown. . . .	571
Tippecanoe County	572
Clinton County.	574
Jasper County	574
Indian Gardens.	575
Crownpoint Interchange.	578
Additional Service in Gary.	579
Interstate Route 69	582
Shift of Corridor: West of Anderson to East of Anderson.	582
Shift of Interstate 69 from a Junction with Interstate 70 to a Junction with Interstate 465	588



TABLE OF CONTENTS (Continued)

	Page
Huntington and the Huntington Reservoir.	594
Fort Wayne Relocation.	598
Extension of Interstate 69	599
Special Cases Involving Access Treatment	607
Allen County.	607
DeKalb County	612
Delaware County	615
Grant County.	615
Hamilton County	616
Huntington County	618
Steuben County.	619
Interstate Route 70	621
Interstate 70 East	621
Richmond Bypass	621
Location of Interstate 70 in Central	
Indiana.	623
Special Cases and Route Service	627
Henry County	629
Wayne County	630
Interstate 70 West	632
Terre Haute Bypass.	632
Strip Mining Conflicts.	636
Interstate 70 in Central Indiana.	639
Special Cases and Route Service	639
Clay County.	639
Putnam County.	641
Vigo County.	644
Interstate Route 74	648
Interstate 74 East	648
Location Studies.	648
Special Cases	649
Dearborn County.	650
Decatur County	650
Shelby County.	651
Interstate 74 West	652
Location Studies.	652
Special Cases	658
Hendricks County	658
Fountain County.	659
Montgomery County.	662
Vermillion County.	664
Tri-State Highway	664
Lake County.	667
Grand Boulevard Separation.	667
Central Avenue Interchange.	671
SR 51 Interchange	671
Commitments by Gary	672

TABLE OF CONTENTS (Continued)

	Page
Porter County.	673
Bethlehem Steel	673
Alternate Location South of Indiana	
Toll Road.	676
Samuelson Road Separation	676
Separation Requests	681
SR 149 Interchange Request.	684
Chesterton.	684
LaPorte County	687
Wagner Road Interchange	687
Grade Separation Requests	689
Additional Traffic Lanes	691
Indiana East-West Toll Road	693
Historical Background.	693
Location Studies	694
Status	697
Interstate Route 265.	697
Location Studies	698
Route Service.	701
SR 111 Interchange.	701
Extension of Interstate 265	702
Louisville Transportation Study	703
Interstate Route 275.	703
Location Studies	704
Route Service.	712
Interstate System Additions in 1968	712
Request for Additions.	714
Northeast Freeway in Indianapolis	715
Interstate 63	716
Interstate 294 Extension.	718
Interstate 164.	720
Interstate 465 West Leg Extension	724
Notes	725
CHAPTER VII - PROGRAM REVIEW	732
Inter-Governmental Cooperation.	732
Construction Progress	735
Early Years.	735
Urban Bypasses and Critical Gaps	738
System Extension	742
Completing the System.	748
Costs	754
Interstate Cost Estimate Studies	754
1958 Cost Estimate.	757
1961 Cost Estimate.	757
1965 Cost Estimate.	761
1968 Cost Estimate.	762
1970 Cost Estimate.	762
1972 Cost Estimate.	764
Additional Cost Estimate.	764

TABLE OF CONTENTS (Continued)

	Page
Evolution of Costs	765
Analysis of Increase from 1949 to 1955	765
Analysis of Increase from 1955 to 1958	768
Cost Analysis from 1958 to 1961	769
Analysis of Increase from 1961 to 1965	770
Analysis of Increase from 1965 to 1968	773
Analysis of Increase from 1968 to 1970	776
Analysis of Increase from 1970 to 1972	778
Future Increases in the Total Cost of the System.	781
Actual Costs	782
Funding	786
Authorizations and Apportionments.	786
Federal Highway Act of 1958	788
Federal Highway Act of 1959	788
Federal Highway Act of 1961	791
Federal Highway Act of 1965	792
Federal Highway Act of 1966	792
Federal Highway Act of 1968	792
Federal Highway Act of 1970	793
Future Legislation.	793
Utilization of Funds	794
Interstate Work Load.	807
Notes	812
CHAPTER VIII - GENERAL BENEFITS.	814
Benefits.	814
User Benefits.	815
Community Benefits	816
Effect on Other Highway Programs.	825
The Second Time Around.	826
Notes	830
BIBLIOGRAPHY	831
General References.	831
Location Studies and Reports.	843
APPENDIX	851

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Estimated Urban, Rural, and Total Mileage, Total Rural Vehicle Mileage and Average Daily Traffic on Rural Sections Studied, Including the Recommended System	37
2	Classification of Public Highway Expenditures	48
3	Inventory of Interstate Mileage Type of Pavement and Class of Area	55
4	Inventory of Interstate Mileage, Surface Width by Class of Area and Type of Facility	55
5	1955-64 National Construction Needs.	66
6	1955-64 Indiana Construction Needs	66
7	Proposed 10-Year National Highway Program Financing.	85
8	Financial Plan for Highway Program	89
9	Interstate Cross Section Characteristics. .	191
10	Interchange and Separation Spacing	223
11	Interchange Classification	234
12	Interstate 275: Cost Comparison of Alternatives	708
13	Interstate Mileage Designated.	758
14	Funds Required to Complete Interstate System	759

LIST OF TABLES (Continued)

<u>Table</u>		Page
15	Estimate of Cost of Completing the Interstate System in Indiana by Route. . . .	760
16	Estimated Total Cost of the Interstate System for Nation.	766
17	Estimated Total Cost of the Interstate System in Indiana.	767
18	Cost Analysis of Increase of Interstate Cost for Nation.	771
19	1965 Interstate Cost Estimate: Cost Analysis of Increase in Cost Over 1961 Estimate	772
20	1968 Interstate Cost Estimate: Cost Analysis of Increase in Cost Over 1965 Estimate	774
21	1970 Interstate Cost Estimate: Cost Analysis of Increase in Cost Over 1968 Estimate	777
22	1972 Interstate Cost Estimate: Cost Analysis of Increase in Cost Over 1970 Estimate	780
23	Expenditures in Indiana.	784
24	Costs of Indiana Interstate Routes	785
25	Interstate Authorizations.	787
26	Status of Financing Federal Share of Cost to Complete the Interstate System.	789
27	Federal Aid Highway Apportionments for Nation	795
28	Interstate Funds Apportioned to the Nation .	796
29	Interstate Funds Apportion to the State of Indiana by Law.	799
30	Federal Highway Program Financing in Indiana.	801

LIST OF TABLES (Continued)

Table		Page
31	Status of Interstate Funds in Indiana. . .	804
32	Estimate of Funds Required to Complete the Interstate System Based on the 1972 Interstate Cost Estimate	805
33	Estimate of Funds Required to Complete the Interstate System Based on the 1974 Interstate Cost Estimate	805
34	Total Contracts Let and Awarded.	810
35	Average Number of Employees in the Indiana State Highway Commission	811
36	Relocation Statistics for Interstate . . .	820
37	Analysis of Relocation Assistance and Payments for Interstate System in Indiana from October 1, 1965 to September 30, 1968	821
38	Analysis of Relocation Assistance for Interstate System in Indiana From October 1, 1968 to June 30, 1973	822
39	Analysis of Relocation Payments for Interstate System in Indiana From October 1, 1968 to June 30, 1973	822
40	Status of Improvement of Interstate Highways in Indiana.	851
41	Mileage Open to Traffic.	874
42	Summary of Interstate Route Mileage. . . .	892

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Major Highways in Indiana Prior to 1850. . . .	11
2	The Transcontinental Toll Road System. . . .	21
3	Location of Existing Routes Selected as Approximating the Lines of a Proposed Interregional Highway System	22
4	The 29,300-Mile System Investigated by the Public Roads Administration as an Interregional System in June 1941.	26
5	The General Location of Routes of the Recommended Interregional Highway System . .	32
6	Relation of the Recommended Interregional System to the Strategic Network of May 15, 1941	34
7	Graph Employed in Refining Committee's Selection of the Interregional System. . . .	37
8	The 36,000-Mile Interregional System	39
9	Rate of Expenditure Based on National Construction Needs from 1954 to 1984	70
10	Rate of Expenditure Based on National Construction, Maintenance and Administration Needs from 1954 to 1984.	73
11	Rate of Expenditure Based on Interstate Construction, Maintenance and Administrative Needs from 1954 to 1984 . . .	74
12	National System of Interstate Highways: Rural Status of Improvement by 1965.	83

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
13	Project Notification and Review System. . .	163
14	Design Process.	169
15	Federal Participation in Cost of Eliminating Pavement Deficiencies	182
16	Typical Interstate Cross Sections in Indiana	190
17	Horizontal Clearances - All Interstate Overcrossing Structures Except Major Long Span Structures.	199
18	Horizontal Clearances - Major Long Span Structures Interstate System Overcrossings.	200
19	Horizontal Clearances Major Span Structures in Indiana	201
20	Horizontal Clearances - Auxiliary Lanes Interstate System Overcrossings	203
21	Guardrail Placement	205
22	Guardrail-Bridgerail Transition	206
23	Roadside Clearance to Bridge Supports . . .	209
24	Interchange Type Selection Process.	228
25	Limit of Federal Participation.	246
26	Limit of Federal Participation.	247
27	Limit of Federal Participation.	247
28	Limit of Federal Participation.	248
29	Limit of Federal Participation.	248
30	Limit of Federal Participation.	249
31	Limit of Federal Participation.	249
32	Limit of Federal Participation for Cross- road Relocation	251

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
33	Limit of Federal Participation for Crossroad Relocation.	251
34	Limit of Federal Participation.	252
35	Limit of Federal Participation from Interchange Ramps	256
36	Federal Participation in Frontage Roads . .	258
37	Federal Participation in Frontage Roads . .	259
38	Environmental Impact Statement Process at the Location Stage.	287
39	Environmental Impact Statement Process at the Design Stage.	289
40	Safety Rest Parks	300
41	National System of Interstate Highways Designated on August 2, 1947.	380
42	Proposed Interstate Routes in the Indianapolis Metropolitan Area in September of 1955	386
43	Interstate 465 - East Leg: Relocation from Shadeland Avenue	395
44	Interstate 465 - East Leg: Comparison of Revised Location with Warren Civic Association Location.	397
45	Woolen's Gardens Area	398
46	Interstate 465 - North Leg: Location Alternatives.	404
47	Interstate 465 - South Leg: Relocation of Southwest Corner	415
48	General Corridors for Interstate Routes Inside Interstate 465	419
49	Interstate 70 - West Route: Original Location.	423

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
50	Alternative Locations for Interstate Routes Inside Interstate 465.	425
51	Interstate 70 - West Route: Revised Location and Alternatives	426
52	Interstate 65 - South Route: Revised and State Avenue Locations.	430
53	Interstate 65 - South Route: Relocation and Alternatives.	431
54	Interstate 70 - East Route: Recommended Location.	434
55	Indianapolis Interstate Highway System Plan of 1957.	437
56	Indianapolis Interstate Highway System Plan of 1957 - Anticipated 1975 Traffic Volumes	438
57	Final Location of the Indianapolis Interstate Freeways	439
58	Central Business District Thoroughfare Plan of 1963.	441
59	Official Thoroughfare Plan for Marion County in 1962.	442
60	Recommended Central Business District Thoroughfare Plan in 1969	443
61	Recommended Thoroughfare Plan for 1985.	444
62	Proposed North Freeway and Northeast Freeway	445
63	The Proposals fo Livable Indianapolis for Everyone and the Indianapolis Tax-payers Association.	448
64	Interstate Type West Leg for the Inner Belt Along the Proposed Harding Expressway.	451

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
65	Interstate Type West Leg for the Inner Belt Through the University Complex	453
66	Supplemental Freeways for Central City: Alternative 1 - Route Through University Complex.	454
67	Supplemental Freeways for Central City: Alternative 2 - Modified Plan	455
68	Supplemental Freeways for Central City: Alternative 3 - Proposed SR 37.	456
69	Supplemental Freeways for Central City: Alternative 4 - Proposed Interstate Freeway System.	457
70	Indianapolis Inner Belt Design in 1970. .	464
71	Interstate 70 - West Route: Alternative Locations Through Stout Field	483
72	Interstate 65: Proposed Interchange Locations South of I-465 in Marion County.	489
73	Interstate 64: Economic Comparison of Route Alternatives	506
74	Interstate 64: Alternative Locations in the Lynnville Area	513
75	Interstate 64: Alternatives in the SR 61 Interchange Area and Near Warrick County Road 600 West	517
76	Interstate 64 - Harrison County Planning Commission Alternative Location	520
77	Interstate 64: The Three General Corridors for the Ohio River Crossing . .	522
78	Interstates 64 and 65: Alternative Ohio River Crossings.	526

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
79	Interstate 65: Alternatives from Seymour to Indianapolis	535
80	Interstate 65: Jeffersonville.	544
81	Proposed Market Street Ramp	545
82	Interstate 65: Jackson County.	550
83	Franklin Thoroughfare Plan.	552
84	Interstate 65: Swanington to Gary.	555
85	Interstate 65: From Lebanon to Fair Oaks.	558
86	Interstate 65: Location Alternatives and Proposed Future Land Use of Lafayette . .	560
87	Proposed Traffic Plan for Metropolitan Lafayette in 1961	561
88	Interstate 65: Alternative Locations in White and Jasper Counties.	564
89	Interstate 65: Alternative Locations in the Proposed Wildcat Reservoir Area. .	567
90	Interstate 65: Alternate Route Through Indian Gardens.	576
91	Interstate 65: Proposed Spur to U.S. 12- 20.	581
92	Interstate 69: Location East of Anderson.	584
93	Interstate 69: Alternative Locations from Pendleton to Fort Wayne.	585
94	Interstate 69: Alternative Locations from Indianapolis to Pendleton.	590
95	Interstate 69: Alternatives in the Huntington Reservoir Area	597

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
96	Interstate 69: Allen County.	600
97	Interstate 69: Alternatives from Waterloo to the Indiana-Michigan State Line.	603
98	Interstate 69: Alternatives in the Lake Charles Area	606
99	Interstate 69: Relocation at the Indiana-Michigan State Line	608
100	Interstate 69: Fishers Area.	617
101	Interstate 70: Alternative Locations from Indianapolis to S.R. 1	625
102	Interstate 70: Additional Construction Costs as a Result of Alternate B.	628
103	Interstate 70: Alternative Locations for Terre Haute Bypass.	634
104	Interstate 70: Initial Relocation in Strip Mining Area	637
105	Interstate 74: Alternatives from Covington to Indianapolis	653
106	Tri-State: Location Alternatives	674
107	Interstate 94: Access Alternatives to Chesterton	686
108	Alternative Indiana Toll Road Routes.	695
109	Interstate 265: Location Alternatives.	699
110	Interstate 275: Alternatives	705
111	Interstate 275: Locations Selected by Consultant	707
112	Interstate 275: Final Location	711
113	Interstate 275: Relocation West of Elizabethtown	713

LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
114	Interstate 69 Extension (Northeast Indianapolis Freeway) and I-465 Connector	717
115	Interstate 64 Spur and Interstate 63: Traffic Assignments for 1990	719
116	Interstate 294 Extension.	721
117	Interstate 164.	723
118	Status of Improvement of Indiana Interstate System as of December 31, 1960.	739
119	Status of Improvement of Indiana Interstate System as of January 1, 1964. . . .	743
120	Status of Improvement of Indiana Interstate System as of January 1, 1968 .	744
121	Status of Improvement of Indiana Interstate System as of December 31, 1971.	749
122	Status of Improvement of Indianapolis Interstates as of December 31, 1972 . . .	752
123	Status of Improvement of Indiana Interstate System as of December 31, 1972.	753
124	National Status of Improvement of Interstate System as of June 30, 1972.	755
125	Federal Aid Highway Program Financing . .	797
126	Interstate Federal Aid Financing: Apportionments, Releases, Obligations, and Collections in Indiana on a Fiscal Year Basis.	802
127	Interstate Federal Aid Financing: Apportionments, Obligations, and Collections in Indiana on a Cumulative Basis	803
128	Social and Housing Characteristics Inner Loop Freeway Plan	824

ABSTRACT

Ripple, David Alan. Ph.D., Purdue University, December, 1973.
The History of the Interstate Highway System in Indiana.
Major Professor: Harold L. Michael.

This work is a reconstruction of the planning, development and implementation of the Interstate Highway Program in Indiana as well as the Nation. The historical data for this record was gathered from Federal reports, documents, and legislation; Federal Highway Administration documents and interviews; Indiana State Highway Commission records and interviews; and other transportation related agency reports and interviews throughout Indiana.

Because of the voluminous amount of data involved, a combination of the stages of the systems analysis process and the highway planning and programming process was used in the reconstruction and presentation of the historical record.

The work begins with a description of the traditional role of transportation in the economy and the role of government in highway development. The need for an interregional super highway system and the goals and objectives of the Interstate Program are documented.

The development of the Interstate Program is traced from its conception in the late 1930's to the landmark legislation in 1956. The highway needs and programs developed by numerous studies during this period are described in detail.

The Interstate Program as set forth by the Federal Aid Highway Act of 1956 and its evolution are described in terms of policies on construction time, the utilization of manpower, the use of material and equipment, and financing. Under

financing, the report covers in great depth the apportionment of funds, federal participation, the use of funds, administrative policy, right-of-way acquisition, the inclusion of toll roads in the Interstate System and the reimbursement to States for completed Interstate sections.

All programs are subject to an evolution in policies and standards which ultimately affect the ultimate product. The research covers Interstate route location and selection, the route alternative evaluation process, the public hearing process, the A-95 Review Process (Project Notification and Review Process), the decision-making process and interagency cooperation, the environmental statement process and highway impact guidelines, policies on multiple use and joint development, the evolution of design standards with a heavy emphasis on safety in design, the evolution of interchange location and spacing, federal policies on fund participation, the evolution of landscape design including billboard and junkyard control, the evolution of the land acquisition process and the relocation process and other processes and policies.

Leaving the national scene, the work concentrates on designation of the Interstate Routes in Indiana, the formulation of the Indiana Interstate Program, and the historical development of the Indiana System. A description of studies and events leading to the development of each Interstate Route is covered in great detail.

Finally, the report assesses the relationship between revenues, expenditures, and cost completion estimates on the Interstate System. The progress of the Indiana System toward completion is documented on a fiscal year basis. A gross overview of the benefits and impacts of Interstate development on the citizens of Indiana concludes the presentation.

CHAPTER I

INTRODUCTION

Never before in the history of mankind has there been a transportation program of such magnitude as the Interstate Highway System. The program is even more unique in that it created an entirely new highway system superimposed over the existing systems. Unlike the traditional Federal and State highway programs which are concerned with the improvement, upgrading and extension of existing highways and are continuous in nature, the Interstate Program was to be completed in a finite time span. Because the Interstate System is new, an opportunity was afforded to systematically plan it.

In such planning, the role of the new system in fulfilling the nation's transportation needs was first defined. To insure fulfillment of the new system's role, new standards of design and location were developed.

Although the Program was not constrained by the limitations of the existing systems, it was still confined by the limited financial resources of the nation. To insure the financial success of the Program, the planners gave consideration to the total productivity of the United States, the general level of expenditures on highways, and the amount of revenue available. This was one of the first attempts in highway capital improvement to balance the flow of revenues and expenditures. Because of the size and complexity of the Interstate Program, the task of developing and implementing the Program was equally complex.

When programs of such monumental importance occur, it is essential that a historical record be made of the activity

so that transportation policy-makers, administrators, engineers, and planners benefit from this past experience in the development and execution of future programs, and so that the achievement is appreciated by posterity. The benefits derived from such a record may be virtually unlimited.

The benefits about to be described have many ramifications and are by no means an exhaustive list. The historical record will be of value to the Indiana State Highway Commission (I.S.H.C.) in the area of policies and procedures which affect the planning, development and implementation processes. The record describes the state of the art and the evolution of methods for determining highway needs; basic criteria for selecting routes and determining route locations; economic analyses for evaluating projects and systems; project review systems and public participation; criteria for determining project priorities; design criteria; and utilization of manpower, equipment, materials and financial resources.

The record may also cultivate an appreciation by the general public of the effort undertaken to improve their general welfare as well as inform them of the processes of highway planning, design and construction. If citizens have knowledge of what they have received for their tax dollar, they may be more likely to support highway programs. The result would be better communication and understanding between the general public and the Indiana State Highway Commission.

This record will also provide personnel of the Indiana State Highway Commission with historical data on highway location, acquisition procedures, severance damages, relocation benefits, construction costs, construction priorities, design modifications, safety features, environmental considerations and other items which may be used at public hearings on new facilities beyond the Interstate System. Information on route location costs and procedures of the past will support estimates on new routes and reduce opposition at public hearings.

The record may provide an improved ability to determine effective procedures for future highway development because of knowledge of what has occurred in the past. This report may improve the ability to determine the effective utilization of manpower, equipment, time and money. The information recorded could serve as the basic input for an impact study and for subsequent history studies. This review may reveal the effectiveness of the procedures utilized and will serve as a source of information for evaluating the effectiveness of meeting Program goals. As of this date, there is no known comprehensive record of the development of the Interstate Highway System in Indiana.

In gathering data for this report, it was necessary to review materials from various sources concerning policies, procedures, practices, design standards and other criteria for the Indiana Interstate System. A partial list of the materials included the access control and location reports of the Indiana State Highway Commission and its consultants, procedure manuals and memoranda of the Indiana State Highway Commission and the Federal Highway Administration, and correspondence between these agencies and the public. This material was supplemented by interviews with personnel of the various Divisions of the Indiana State Highway Commission, including the administrative staff, and personnel of other agencies involved in the development of the System in Indiana.

This historical record is intended to be an unbiased and consistent reconstruction of the planning, development, and implementation of the Interstate Program at the State and National level. Because the voluminous amount of data generally defied comprehension, the methodology employed to reconstruct and present the history involves the division of the Program into several stages. For reasons of consistency and applicability, the stages are best described as elements from the combination of the systems analysis process and the

highway planning and programming process. This report is organized in a manner consistent with the stages of these processes.

The first stage (Chapter II, Interstate Highway Goals and Needs) covers the recognition of the need for a vastly improved highway system and the establishment of goals for such an improvement. Goals for the Interstate Program provide a sense of direction and serve as a measure of attainment for the Program. Federal legislation and studies provided most of the goals for the Interstate Highway Program. Modifications, additions and elaborations of the Federal goals by the State appear to be very minor.

Chapter III describes the investigation of various concepts to accomplish the goals. Numerous studies attempted to determine the deficiencies of the existing highway system and to formulate a concept for correcting these and future deficiencies of the system. All the studies recommended the creation of an entirely new highway system, over and above the existing primary, secondary and State systems, as the best concept to attain the goals.

The next stage (Chapter IV, The Program and Its Evaluation) considers the means chosen to accomplish the established goals, given that the creation of a new system is the best concept to attain the goals. The means involves statements or policies on the amount of time allocated for construction of the System, the amount of manpower utilized including the level of effort and source of labor, the amount of materials and equipment required including their availability and source, the methods used in financing the program, and the general design criteria established. These statements set forth standards which insured the effective utilization of the resources available to accomplish the goals.

The Program is the embodiment of these statements into a plan which insured a constant flow of resources to accomp-

lish the task. If the resources were inadequate, the Program set forth policies to overcome the deficiencies. Furthermore, the Program scheduled expenditures on the improvement to match the flow of revenues and suggested means to overcome any revenue deficiencies to insure the constant flow of monies. Excerpts from Federal legislation and studies provide most of the information on changes in the initial Program.

Because policies and standards of the Program vary over time and ultimately affect the end product (the Interstate Highway System), Chapter V (Evolution of Policies and Standards) describes the evolution of regulations and criteria as well as their effect on the Interstate Program. Federal and State documents and personnel interviews provide information on the evolution of general design policies and standards. The chapter includes the evolution of corridor selection and route location criteria, the methodology used to evaluate alternate locations and designs, the highway design and construction processes, and the criteria for establishing construction priorities.

Chapter VI, The Route History, is a reconstruction of the implementation of the Interstate Program. This stage is a what, when and where reconstruction of the histories of Indiana Interstate routes. The route location studies, public hearings, access control studies, design processes, and construction processes are retraced on each route. In reconstructing the events and activities, one must recognize that the resolution of the events was based on the knowledge available at that time and other limitations or constraints. This record is not a critique of decisions made in the past, nor is it an attempt to evaluate decisions of the past by the policies, procedures, knowledge, criteria, and regulations of today. The reader is cautioned to evaluate events in the context of their own time. Such an attempt has been made to reconstruct events in this record.

Program Review (Chapter VII) is an overview and summary of the implementation of the Interstate Program in Indiana. This stage reviews the expenditures and status of the Program so as to measure how effectively the Program goals have been met. This chapter describes the intergovernmental cooperation that occurred during the Interstate program; the progress of the Interstate toward completion; the various estimates of cost to complete the System; the evolution of costs; actual costs; the influence of funding on the Interstate Program; and the level of effort by Indiana State Highway Commission personnel and consultants.

The Conclusion (Chapter VIII) sets forth the benefits of the Interstate Program in Indiana as a measure of return for the expenditure. This is a gross overview of the benefits that have and will continue to accrue to Hoosiers due to the improvement of transportation through the Interstate System. The conclusion also contains a summary of the evolution of the Interstate Program and the standards by which it was developed. This is to impress on the reader that the Program was not implemented in a vacuum or state of equilibrium, but that it was implemented in a state of flux and was itself subject to the flux.

As the Interstate Highway System in Indiana will not be completed at the time this report is made, this historical report will only be the first phase of a complete record. However, this report is primary in nature and only a few additions will be needed to update it once the System is completed. Although December 31, 1971, is the cutoff date for the first phase of the historical report, data as current as possible was utilized to minimize the revisions necessary for a final report after the Interstate System is completed.

CHAPTER II

THE NEED FOR AN INTERSTATE HIGHWAY SYSTEM AND INTERSTATE SYSTEM GOALS

Before any capital improvement is undertaken, the need for such an improvement must first be recognized. In the process of defining the general need and developing general goals to satisfy the need, knowledge of how the need arose and an understanding of its context in time are useful.

The Traditional Role of Transportation

Transportation is one essential ingredient of urbanization and commerce. In our early agrarian society where a subsistence economy existed, there was little commodity exchange and, therefore, little need for transportation to facilitate exchange.

As improved farming technique created a surplus of essentials, some people were released from the land and allowed to devote their full time and talents to the production of goods needed by the farmer. Thus, the specialization which began resulted in increased economics of scale in commerce and industry and changed social habits for human beings. Transportation provided the means of moving the farm surplus to central places where the surplus could be aggregated and utilized. Those released from the farm gravitated to these central places where they could have access to the essential commodities and exchange their services for these essentials. Thus, transportation became a necessity for commerce and urbanization. At this stage in history, transportation was used as a means to transport essentials and to obtain specialized services.

With the advent of the industrial revolution, cottage industries began to decline because mass production and new power sources required a greater capital outlay than one individual could afford. This resulted in the separation of worker from his place of work and eventually the separation of the factory from the distribution center. These factors created the commuter and the need to transport manufactured goods to the market place. The result was transportation's role today - transportation is used to transport essentials to the market, to carry the worker to the factory, to carry the manufactured goods to the market, and to carry the farmer and urbanite to the market.

As new modes of transportation developed, the time-distance relationship decreased. This allowed factories to consolidate in order to take advantage of increased economics of scale since the cost of shipping raw materials over greater distances was less. Transportation also increased the market area for goods. As industry concentrated in urban areas, so did the workers; thus, cities began to grow in size because of the aggregation of factories and, thereby, workers. Because new transportation modes reduced the time-distance relationship, workers could live farther from their place of work as they could commute greater distances in the same amount of time. This resulted in the phenomenon of decentralization which was also encouraged by the attempt of the urbanite to escape disadvantages of living in the central city.

The advent of the motor vehicle further increased the mobility of man and reduced the time-distance relationship. This further accelerated the rate of decentralization of urban areas. With a rising level of family income also came increasing motor vehicle ownership. These phenomena have resulted in increased congestion on existing highways in urban areas.

Early Governmental Involvement In Transportation

In the early years of the United States, the Federal government dabbled in isolated highway construction projects to open the interior of the nation for settlement and to expand the national economy. The most notable project was the Cumberland Road which had been invisioned by President Jefferson as early as 1806. Congress appropriated money to build this road in 1829, and it was completed to Indianapolis in 1838. Today the Cumberland Road is better known as the National Road or U.S. 40. Until the advent of the Interstate system, it was one of the most heavily traveled roads in Indiana. The Federal government also subsidized the railroads, particularly after the Civil War, in order to open the west, link the Nation, and expand the economy.

When Indiana became a State in 1816, five percent of the funds derived from public land sales within the State were set aside for the construction of public roads and canals. Sixty percent of these funds were retained for use within the State under the direction of the State legislature; the remaining forty percent was retained by Congress to build roads to the State. The Federal percentage, along with funds from Ohio and Illinois, were used to finance the Cumberland Road.

Indiana's three percent went primarily to open up means of communication between communities and to link those communities in the southern part of the State to Indianapolis, the capital. No administrative agency was given the authority to layout, build and maintain the State roads, and the Indiana legislature authorized the construction of each road by a separate legislative act. The maintenance that was performed on the State roads was done by district supervisors with the aid of labor from each community.

Prior to 1850, major roads built during the era of "Internal Improvement" in Indiana included the Old Vincennes Road (Vincennes and New Albany Turnpike) from New Albany

through Greenville, Fredericksburg, Paoli, Mt. Pleasant and Washington to the Wabash River at Vincennes presently U.S. 150; the Lafayette-Jeffersonville Turnpike from New Albany through Salem, Bono, Bedford, Bloomington, Greencastle and Crawfordsville to the Wabash River at Lafayette - approximated today by SR 60 from New Albany to Mitchell, SR 37 to Bloomington, SR 46 to Spencer and U.S. 231 to Lafayette; the Michigan Road from Madison through Greensburg, Shellyville, Indianapolis, Logansport and South Bend to Michigan City (secured through special treaty with the Potawatomi Indians and an Act of Congress) - approximated by U.S. 421 from Madison to east of Frankfort, SR 29 to Logansport, SR 25 to Rochester, U.S. 31 to South Bend and U.S. 20 to Michigan City; and the National Road from Richmond through Cambridge City, Indianapolis and Greencastle to Terre Haute - approximated by present U.S. 40. [Refer to Figure 1, p. 11]. During this era, private companies were authorized to build turnpikes and plank roads and to charge tolls for their use.

Because of the heavy debt incurred in the internal improvement program, and particularly the failure of the bond issues on the Indiana canal system, the Indiana State government went into bankruptcy in the late 1830's. As a direct result, the new Indiana constitution prevented any deficit financing by the State government.

Because the State road system became too complex to administer through individual road acts and appeared to be only of local significance with the coming of the railroad era, the State roads were turned over to private companies and counties for maintenance. All new road construction was done by these companies and financed through tolls.

Initially, rural highways were maintained by the abutting property owner. As an individual's time became limited, he began to pay the local government to perform the task rather than perform the task himself. In 1877, Indiana began to

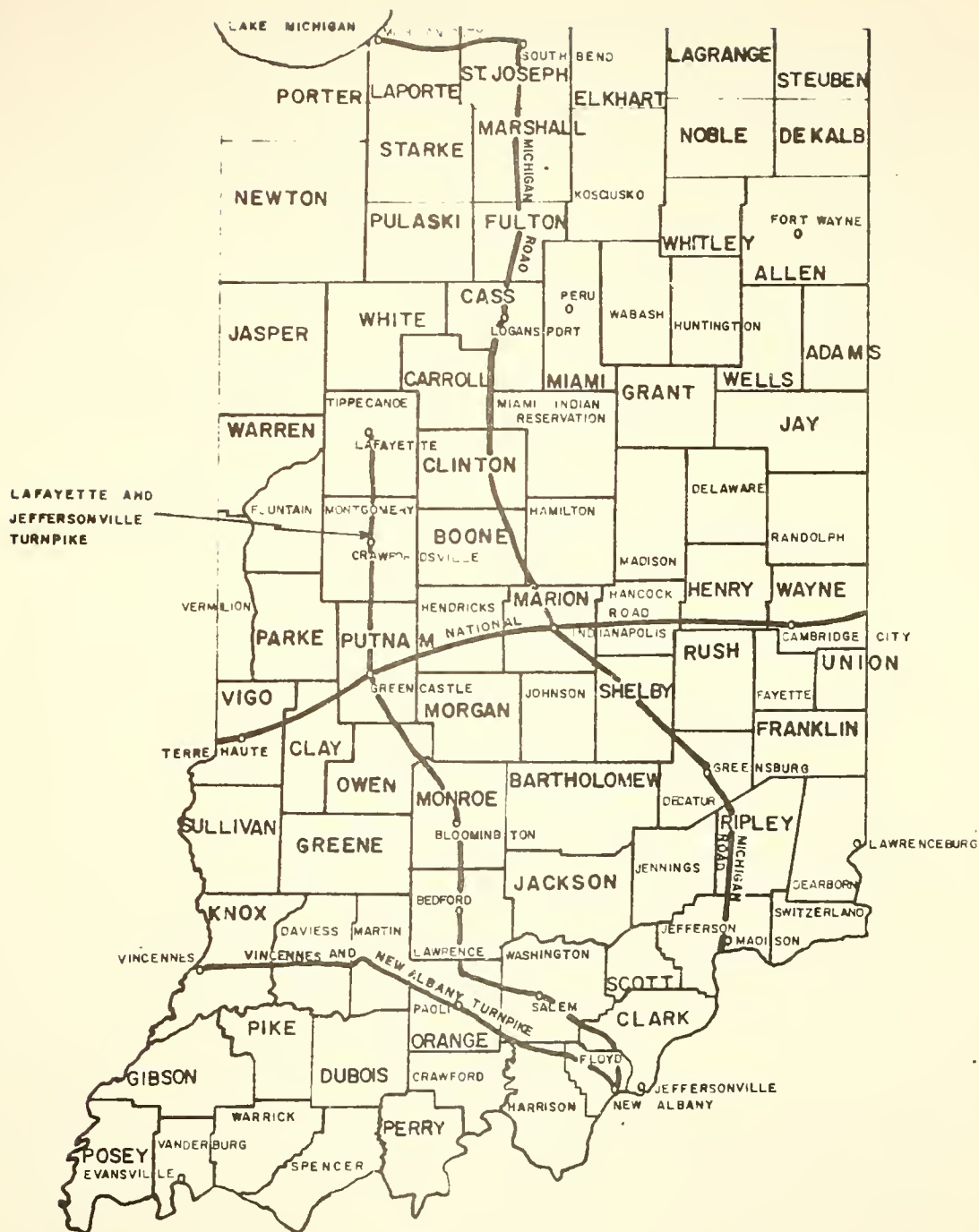


FIGURE 1. MAJOR HIGHWAYS IN INDIANA
PRIOR TO 1850

build free gravel roads. Counties were authorized to issue bonds (to be retired by assessments on the benefiting properties) to build these free roads and to purchase private toll roads for free county roads. The responsibility of maintaining these free roads was turned over to the counties in 1879.

In summary, the Federal and State governments played a limited role in highway transportation development in the Nineteenth Century. No continuous highway construction program existed during this era, and no administrative agency was given sole responsibility for laying out, building and maintaining a State or National road system.

Governmental Involvement in Highway Transportation on a Continuous Basis

The Federal-Aid Road Act of 1916 signaled the entrance of the Federal government into highway construction with the financing of intercity highways. To obtain these Federal funds, the States were required to provide matching funds.

The Federal government supervised projects utilizing Federal highway funds and exercised some measure of control in laying out, designing and constructing these roads. The States were responsible for the maintenance of such roads and had to have a highway department for the receipt and expenditure of the Federal aid funds.

Probably motivated by the Federal Act, the Indiana General Assembly created the Indiana State Highway Commission on March 7, 1917. The 1917 Act, however, was declared unconstitutional by a decision of the Court in Hamilton County. As a result, the Commission suspended meetings until the constitutionality of the law had been decided by the Indiana Supreme Court. The Supreme Court reversed the lower court decision. However, in 1919 the Indiana General Assembly repealed the 1917 act and created a new Indiana State Highway Commission.

The 1919 Act required the Commission to lay out a system of State highways connecting every county seat, town over 5000 population, and the trunk highways of adjoining States by April 20, 1920. The original Indiana State Highway System consisted of 3,221 miles of State highways, about five percent of the entire road system in Indiana. The present 11,714 mile State Highway system covers about 11.2% of the entire highway system in Indiana and carries more than fifty percent of the vehicle-miles.

Due to the unrelated and unintegrated improvement of State highways with Federal funds and the resulting failure to form a consistent network of intercity links, the Federal Highway Act of 1921 required the States to select seven percent of the total rural mileage to be designated as the Federal Aid System. This would hopefully insure a connected system of highways of interstate character receiving Federal funds.

The Federal Highway Act of 1921 also provided Federal aid to extensions of the Federal aid system through communities of less than 2500 population. The Emergency Relief and Construction Act of 1932 allowed Federal monies to be used for urban stretches of Federal aid highways. The Hayden-Cartwright Act of 1934 extended Federal aid to highway construction within municipalities as emergency relief. In 1936, grants in aid were allowed on urban extensions of the Federal aid systems for elimination of hazards at railroad grade crossings.

The Need Arises

In the late 1930's, the conventional primary system, which moved traffic and provided access to abutting land uses, could no longer move traffic efficiently and safely between major cities. The need for a transcontinental network of superhighways designed to move traffic rapidly and safely became clear. Research and experience by this time had also emphasized that such efficient movement was not possible if roads were also required to serve adjacent property.

In 1938, Congress requested that the Director of the Bureau of Public Roads conduct a study of the feasibility of a toll financed system of three east-west and three north-south superhighways. The resulting study, Toll Roads and Free Roads of 1939, determined that the suggested toll road system would not be self-supporting. However, the 1939 report documented the need for an interregional superhighway system connecting the major metropolitan areas. The formal origin of the Interstate Highway System is generally traced to this report to Congress in 1939.

Subsequent studies further substantiated the need for an interregional highway system and set forth goals for such a system. These needs studies and proposed highway programs are the subject of discussion in the next chapter of this report.

Goals

From needs studies, various proposed highway programs and legislation came most of the goals for the Interstate System. The overall goal of the highway network was to provide for the rapid, safe and efficient movement of goods and people. Inadequate highways endangered the health, national security and safety of the citizen; impeded the free flow of traffic; contributed to accidents and congestion; increased motor vehicle operation costs; depreciated property values; and obstructed the normal social and economic progress of the Nation. Since the Interstate System carried one-fifth of the total vehicle miles and linked all regions of the Nation, it was the most important highway network. Subsequently, improvement of the Interstate System was essential in meeting overall National goals.

Although overall goals appeared in almost all needs studies and proposed highway programs, certain goals were predominant and provided the impetus to a needs study or proposed program at a particular time. Immediately prior

to United States' entrance into World War II, the emphasis of the studies was on military preparedness. The initial interstate study, Toll Roads and Free Roads, and the 1941 needs study, Highways for the National Defense, justified the improvement of an interstate system primarily on the basis of National defense and secondarily on the basis of economic growth. The National Interregional Highway Committee supported the improvement of the Interstate System as a means of stabilizing the national economy and particularly as a means of preventing an economic slump after World War II. The Committee placed nearly equal emphasis on improvement of the System for the goals of future economic growth and national defense. The 1949 needs study, Highway Needs of the National Defense, stressed improvement of the Interstate System on the basis of the System's strategic importance; however, improvement of the System on the basis of its importance to the economy and the highway user was also emphasized. The 1954 needs study and the document a 10-year National Highway Program supported improvement of the Interstate System primarily on the basis of the need of an adequate highway network for sustained economic growth. The Interstate Program, however, was cited as an essential defense need when it was funded in 1956.

The various program development studies over the years specified that the interstate system was to link all regions of the Nation. This was the primary working goal for the interstate system - the primary task the Interstate System was to accomplish. The program development studies further specified that route selection was to be based on connecting the major population areas and serving the heaviest travel desires. The 1944 interregional highway study set forth an extensive list of specific goals for the interstate system. These included connecting major population, industrial and agricultural concentrations; linking areas of high motor

vehicle ownership concentrations; conforming with the strategy highway network; linking major military and naval establishments and war industry; serving the heaviest traffic demands; and insuring a consistent and integrated system of highways.

Federal legislation codified the specific goals for the interstate system into law. Section 7 of the Post-War Federal-Aid Highway Act of 1944 stated:

"There shall be designated within the continental United States a National System of Interstate highways not exceeding 40,000 miles in total extent so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities and industrial centers, to serve the national defense, and to connect at suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico"¹*

The Federal-Aid Highway Act of 1956 reiterated these goals and added a new goal. The 1956 Act still called for the funding of an improved transportation system to meet the needs of a growing economy and to improve the national and civil defense, but added to meet increasing local needs for transportation where feasible.

As the urban transportation problem began to grow, the last objective (that of serving local needs) received greater emphasis. Although the primary role of the Interstate System was the connection of major metropolitan areas, the Interstate System sections in urban areas were increasingly viewed as a means of alleviating urban transportation problems. The interpretation of this objective was to pose problems throughout the Program.

* Superscript numbers refer to Notes at the end of the chapter.

Notes

1. Laws Relating to Federal Aid in Construction of Roads
(Washington, D. C.: U.S. Government Printing Office, 1971), p. 146.

CHAPTER III

DEVELOPING A PROGRAM

Once the goals and objectives had been established, the next step was to investigate the various concepts to accomplish the goals. The alternative concepts to be considered included maintenance of the existing level of service on the existing highway systems; improving the level of service (upgrading) on the existing highway system; improving the level of service, primarily by expanding the existing highway systems; creating a new highway system but by upgrading and incorporating segments of existing highway systems; creating an entirely new highway system; or combinations of these alternatives. Over a period of seventeen years (1939-1956), numerous studies attempted to determine the present and future deficiencies of the existing highway systems, to formulate a concept to correct these deficiencies and, thereby, to attain the goals set forth. These studies also considered the means necessary to accomplish the established goals utilizing the concepts selected. The means generally involved statements or policies on the utilization of resources (material, human, and financial), the scheduling of revenues and construction expenditures, and the general design standards to which improvements were to be built.

The needs studies and proposed highway program studies were closely interrelated since the needs served as a basis for a proposed improvement program. However, the needs studies concentrated on the determination of present and possible future highway deficiencies and on the cost to

overcome these deficiencies, and left the formulation of means to correct the deficiencies to the improvement programs. On the other hand, the improvement programs concentrated on the formulation of the means to overcome the deficiencies and incorporated the findings of needs studies.

The elements of these studies that were incorporated in the accepted Interstate Program will be reiterated and elaborated in the next chapter.

Toll Roads and Free Roads

The Federal-Aid Highway Act of 1938 first enunciated the concept of a national system comprised of key high volume highways. Section 13 of this Act states:

"The Chief of the Bureau of Public Roads is hereby directed to investigate and make a report of his findings and recommend to the Congress not later than February 1, 1939, with respect to the feasibility of building, and cost of, superhighways not exceeding three in number, running in a general direction from the eastern to the western portion of the United States, and not exceeding three in number, running in a general direction from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads."¹

In April of 1939, the Bureau of Public Roads presented the toll road feasibility report Toll Roads and Free Roads to Congress. The report concluded that financing of the full costs of the six superhighways by direct tolls was not feasible. However, the report documented the need for a system of interregional highways and demonstrated the important relationship of such a system to the national defense. This concern was codified by the report in "The Master Plan for Free Highway Development"; the details of which were to be worked out in later studies.

The six toll roads of 14,336 miles were estimated to cost \$2,899,800,000, were to be constructed over a fifteen year period from 1945 to 1960, and were to be financed by a 30-year loan at 2.6% interest and 2.24% interest for retirement.² The toll road committee laid out the tentative routes and estimated the respective construction costs. [Refer to Figure 2, page 21]. After an evaluation of the traffic volumes and the forecasted tolls, the committee found that direct tolling would only pay for one-third of the construction cost for the entire toll system.

As a note of interest, the portion of the proposed toll road system in Indiana, which coincides with the present East-West Indiana Toll Road, was estimated to be one of the ten most heavily traveled sections of the proposed toll road system. Although the cost of constructing the Indiana section of the toll road system was estimated at \$30,301,460, this section of the system could be feasibly financed by toll collection, except for a small portion in far eastern Indiana.³

Two desirable characteristics of toll roads - long distances between access points and alternative free routes - made the interregional toll road system infeasible. However, rebuilding and improvement of the main rural highways was but one element in a larger program, called "The Master Plan for Free Highway Development", which sought to modernize and extend public streets and highway facilities. The master highway plan called for the modernization of the Federal-Aid System; the elimination of hazardous railroad grade crossings; the improvement of secondary and feeder roads, properly integrated with land use programs; the establishment of a Federal Land Authority to acquire, hold, sell and lease lands needed for public purposes and to acquire and sell excess lands for the purpose of recoupment; and the construction of an interregional highway system to serve defense and growing traffic volumes. Due to the rapidly

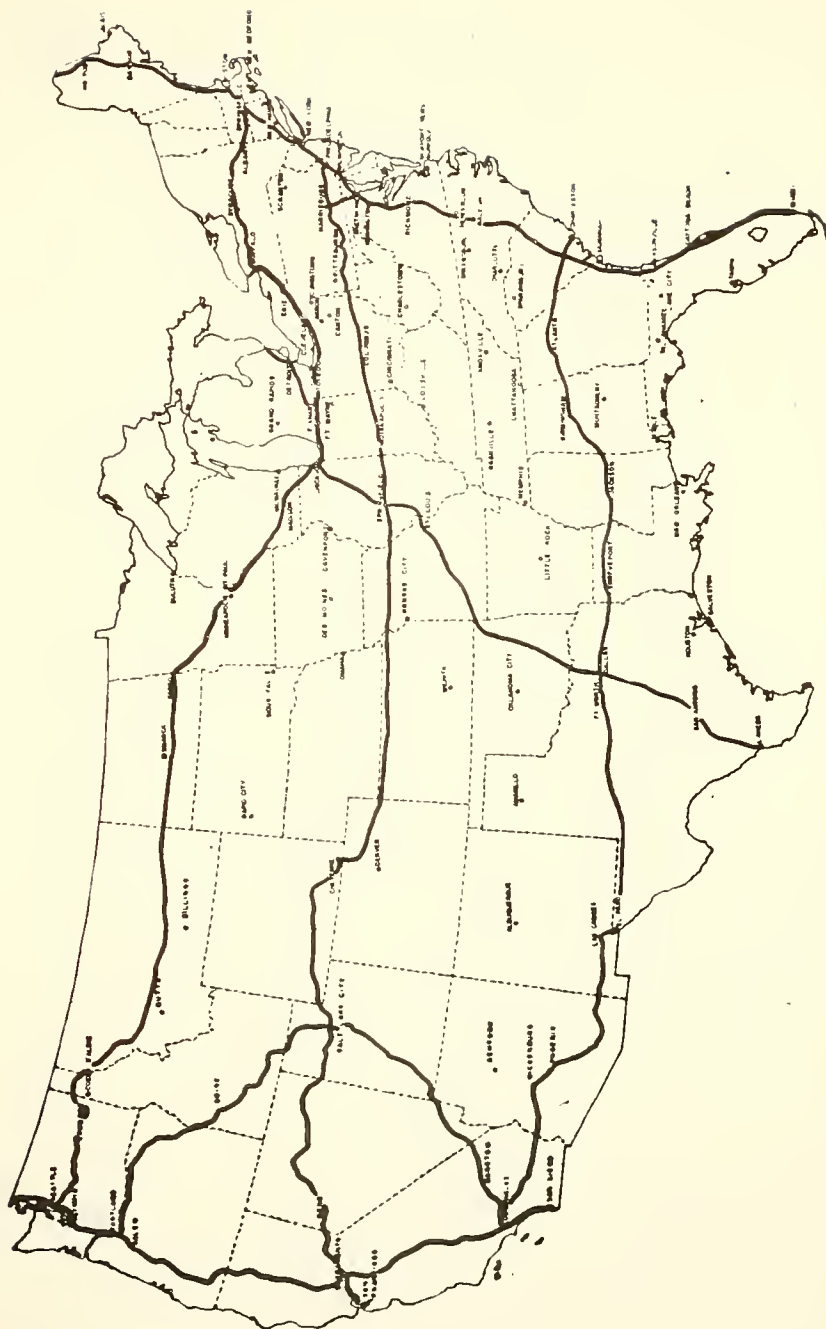


FIGURE 2. THE TRANSCONTINENTAL TOLL ROAD SYSTEM⁴ (14,336 MILES)

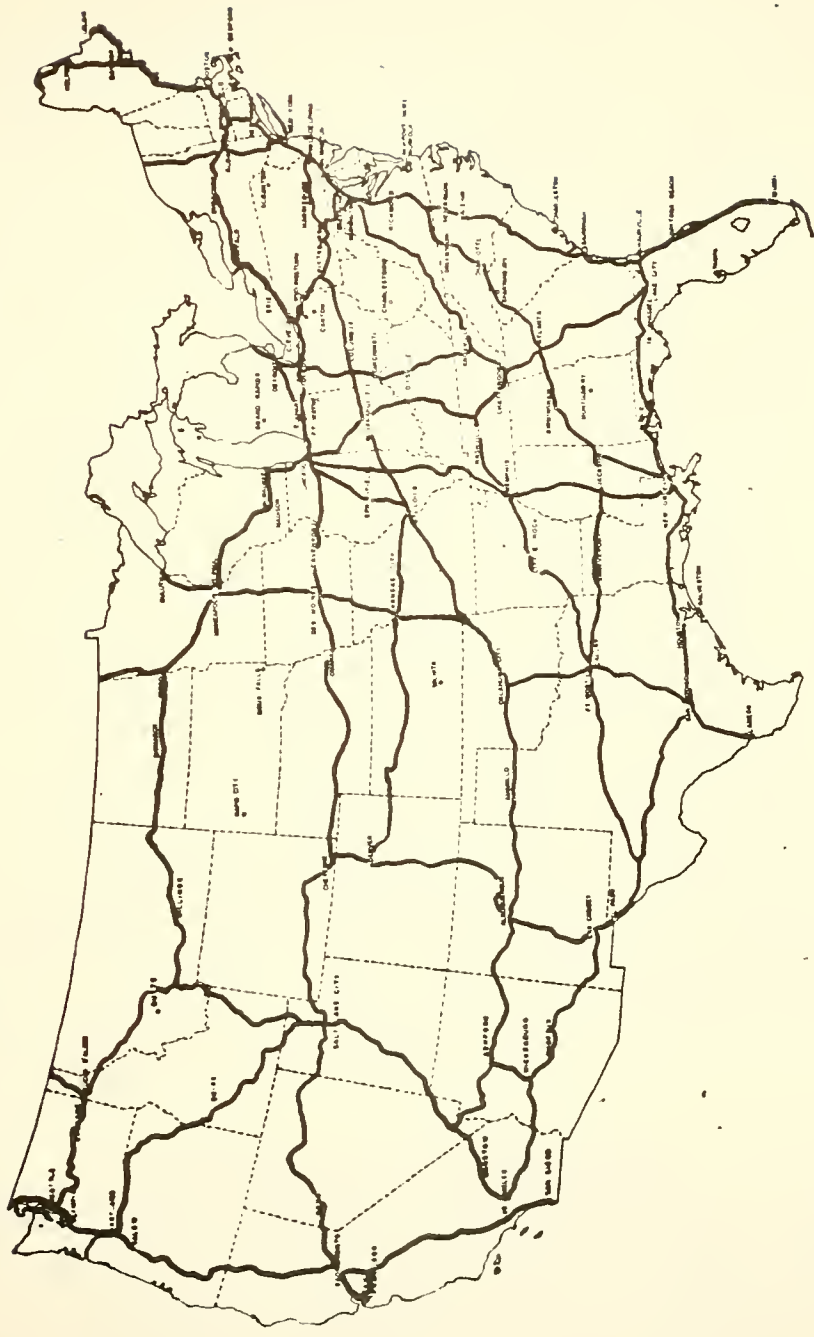


FIGURE 3. LOCATION OF EXISTING ROUTES SELECTED AS APPROXIMATING THE LINES OF A PROPOSED INTERREGIONAL HIGHWAY SYSTEM⁵ (26,700 MILES)

increasing volumes in urban areas, the master highway plan recognized an increasing need in urban areas for new highways, such as belt lines and bypasses, and for new means of financing. To overcome highway deficiencies in rural areas, a 26,700-mile interregional highway system was designated on the basis of traffic volumes, population concentrations, and the suggestions of the War Department. [Refer to Figure 3, page 22]. It was also recommended that the federal government bear more than fifty percent of the cost of constructing the interregional highway system. Final location of the interregional system was to be determined by further study under the direction of the Bureau of Public Roads in cooperation with the War Department and State highway departments.

Despite the financial infeasibility of an interregional toll road system, H. A. Wallace (the Secretary of Agriculture) stated: "Primary importance (was) attached to the designation and progressive improvement of a system of direct interregional highways designed to facilitate the long and expeditious movements that may be necessary in the national defense, and similarly wide-ranging travel of motorists in their own vehicles - a travel which, in addition to its immediate recreational benefits, is a powerful force for national unity."⁶ Thus, the Interstate System had its birth for the primary reason of defense, which is understandable considering the times.

The Future of Indiana Roads

In 1940, the Chairman of the Indiana State Highway Commission reviewed the present status of Indiana and captured the feeling of the times toward future highways in an address to the 26th Annual Road School at Purdue University.

The Nation had begun to realize the importance of roads in social and economic life. Because of war conditions, there was recognition of the importance of roads in national defense. There was also a feeling that governments could no longer afford to invest the highway dollar in highways that go nowhere or cost more to maintain than they can earn through the traffic served, and that more funds would be spent on maintenance and reconstruction than new roads.

In 1938, Indiana was ninth in motor vehicle registrations, yet thirty-sixth in the user tax per vehicle. Ninety-five percent of the county bridges and sixty percent of the State system bridges had widths of less than twenty feet. Fifty-seven percent of the county and seventeen percent of the State system bridges had a loading capacity of less than five tons. Twenty percent of the State system and seventy-one percent of the county system had rights-of-way of less than sixty feet.

Although Congress had proposed a national system of superhighways financed by tolls, few sections of Indiana's highways could be feasibly financed by tolls at that time. Nevertheless, Indiana had begun to build four-lane divided highways and to overcome deficiencies in bridges and rights-of-way. The need for controlled-access highways, however, was still sometime in the future.

Highway Needs for National Defense

In 1940, President Franklin D. Roosevelt requested the Public Roads Administration to make a survey of the adequacy of highways for National defense. On February 1, 1941, the report entitled Highways for the National Defense suggested improvements for the 74,600-mile strategic highway network which connected defense industry centers and military concentration points. The strategic highway network coincided with a strategic highway map developed by General

Pershing plus a few additions. The routes of greatest importance on the strategic network coincided with those chosen by the Bureau of Public Roads in Toll Roads and Free Roads for inclusion in the system of interregional highways, which was an alternative to the proposed national toll road system.

The major improvements recommended for the strategic highway network and, to a degree for the smaller interregional highway system, included the strengthening of bridges of less than 15,000 pound shear design, the widening of 5,090 miles of highway of less than eighteen-foot width, and the resurfacing of 14,000 miles of roads incapable of supporting 10,000-pound axle loads. The Public Roads Administration estimated that \$485 million would be needed to correct these deficiencies and suggested that a minimum of \$100 million be made available immediately to the States at somewhat higher than an equal matching basis and that \$12 million be made available for plans and surveys to upgrade the strategic network.

Planning the Interregional Highway System

Further studies were made in establishing the location of the interregional highway system as recommended in Toll Roads and Free Roads. Federal and state agencies cooperatively selected 29,330 miles (25,554 rural miles and 3,776 urban miles) of existing highway that approximated the routes of the proposed interregional highway system. [Refer to Figure 4, p. 26]. The basis for selecting this mileage was service to population centers and inclusion of the most heavily traveled routes (eleven percent of the total rural vehicle-miles in 1937 were included in the routes selected for the system.) with deviation from direct routes between major population concentrations to serve the largest intermediate urban areas. The interregional routes were to join

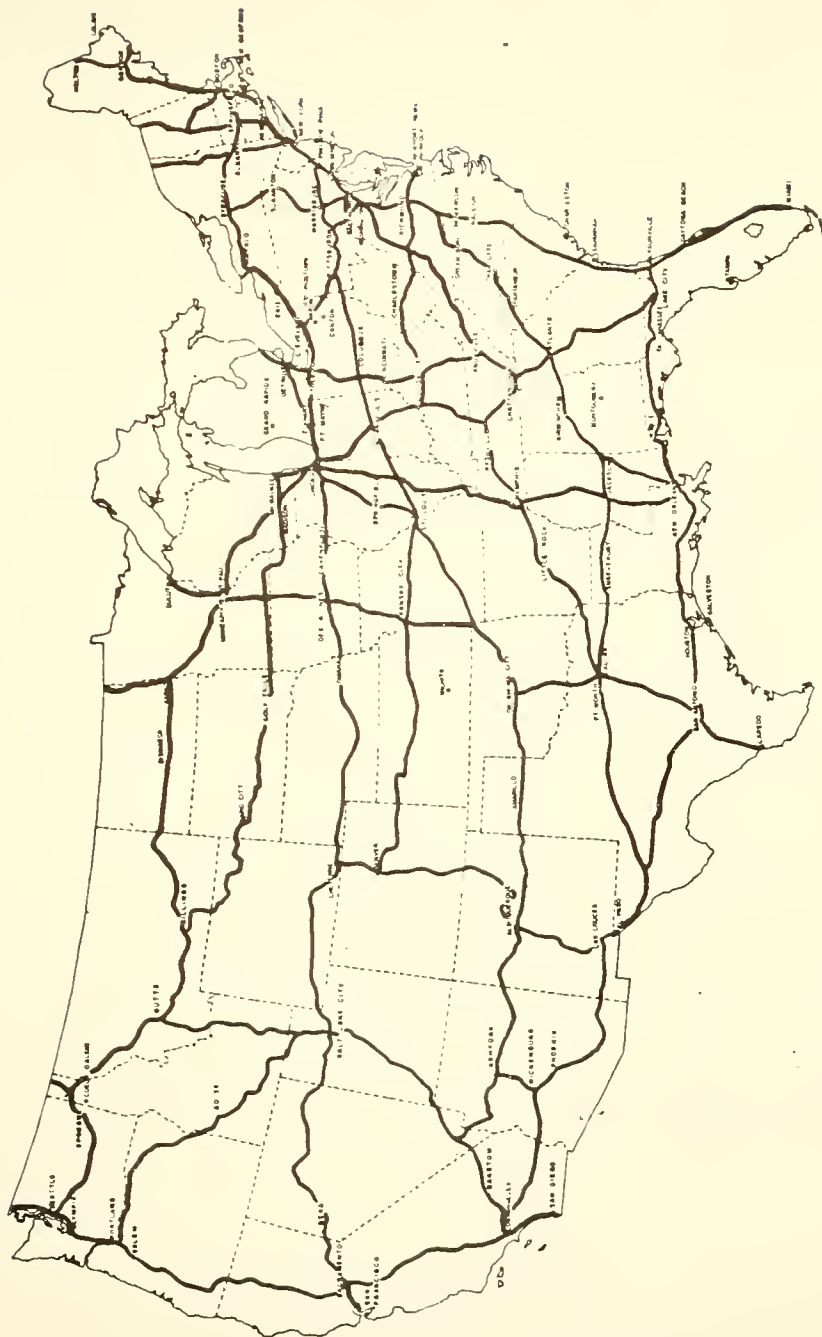


FIGURE 4. THE 29,300-MILE SYSTEM INVESTIGATED BY THE PUBLIC ROADS ADMINISTRATION AS AN INTERREGIONAL SYSTEM IN JUNE 1941⁷

urban facilities that would provide free flow of traffic through the centers of major cities; however, to assure the free flow of intercity traffic, limited-access belt lines might be required in the larger cities. The interregional highway system was to bypass all small communities. The completed interregional system was to consist of one percent of the total rural mileage, yet would carry 12.5 percent of the total rural vehicle-miles.

Because of the belief that rural highways beyond the immediate vicinity of cities were of sufficient capacity to carry existing traffic, rural highways were to be upgraded to interregional system standards only when each section could no longer provide adequate service.⁸ The regional distribution of the interregional routes was compared with various indices (population, area, national wealth, national income, cash value of farm income, value of manufactured sales, and value of mineral production) to evaluate the location of the system and justify its construction. Based on 1937 motor vehicle taxes (0.582¢ per vehicle-mile) and a 173% growth in traffic on the system over the next 30 years, the ratio of earnings to cost varied from 1.59 for sections with volumes under 3000 vehicles per day to 1.73 for sections with volumes between 3000 and 9999 vehicles per day to 2.00 for sections with volumes over 10000 vehicles per day over a thirty year amortization period.⁹ Hence, the interregional highway system, which was estimated to initially cost \$3,911,572,000, was a financially feasible undertaking over a thirty year period.

Interregional Highways

On April 14 of 1941, President Franklin D. Roosevelt appointed the National Interregional Highway Committee to investigate the need for a limited system of national highways to improve the present interstate transportation

facilities, to determine the desirable level of improvement for such a system and to investigate the possibility of utilizing the excess manpower and industrial capacity anticipated to be available after the war to carry out such improvements. In 1943, Congress, via section five of the Federal Highway Act of 1943, further directed the Public Roads Administration to make a survey of the need for a system of expressways, the number needed, the cost of constructing such a system, and the necessary legislation.

A single report entitled Interregional Highways was developed by the National Interregional Highway Committee in cooperation with the Public Roads Administration and was presented to Congress in 1944. The report documented the need for an interregional system of highways and recommended the designation of a 39,000-mile interregional system of urban and rural highways which connected the principal geographic regions of the Nation and generally followed the routes of existing Federal aid highways. Although the proposed system included approximately one percent of the total road mileage in the Nation, it was expected to carry one-fifth of the total vehicle-miles. Development of the system was deemed essential to the future economic growth and defense of the Nation by the Committee. The study also recommended improvement of the system to high geometric design standards including limited-access control. No overall cost estimate was made for the system, but the estimated expenditure rate to construct the system was \$750 million per year with two-thirds going to urban and one-third to rural segments of the system.

In his message to Congress accompanying the final report, the President was particularly concerned with the problem of right-of-way acquisition for the system. Although it is generally cheaper to build a new route than to widen an existing route and despite the fact that acquisition cost usually increases with time, he felt that final routes

should not be definitely fixed in the planning stages. President Roosevelt pressed for the implementation of the interregional highway program because it would utilize excess productively during the post war period and avert a recession that usually follows a war. He also stressed the need to modernize the transportation system to meet increasing transportation demands and the importance of such an improvement to the Nation's long range economy.

Background for Study

The Federal Aid Highway Act of 1916, the first modern legislation for Federal support of highways, did not require highway classification; consequently, highway construction resulted in isolated or disconnected sections of highway. The principle of classification by function and preferential treatment was emphasized by the Federal Highway Act of 1921; under this legislation, the states were allowed to designate seven percent of their rural mileage as eligible for Federal funds. This designation insured coordinated improvement of interconnected segments of a system as opposed to improvement of isolated and unrelated sections of highway.

For many years since initial Federal involvement in highway financing, the policy of staged construction had been universally accepted. However, the upgrading of highways on existing alignments created problems on the interregional system. Increases in motor vehicle registration, traffic volume, and speed had not been fully anticipated; even if they had been foreseen, a lack of necessary legal sanctions prevented advanced acquisition of rights-of-way for wider and divided highways. Many highways of regional importance had become obsolete in design, lacking the capacity and alignment to carry traffic at high volumes and high speeds.

The primary reasons for immediate designation of the interregional system were as follows: (1) the most important highways had suffered because of obsolete locations, alignments, and right-of-way widths; (2) although these roads still had physical life remaining, they were functionally obsolete in design and capacity; (3) these roads had long since repaid their cost in benefits; and (4) for the main highways of the Nation to be improved uniformly, they had to be designated for special treatment.¹⁰ Other reasons for designating the system included the past neglect of urban highway deficiencies and the discovery that highway deficiencies were more severe in urban areas than rural areas. This implied that transcity connections were now important.

The optimum system to be selected was to hold national needs as paramount, to connect metropolitan areas and intermediate cities such that the system encompassed the origins and destinations of most traffic flow, and to include high volume routes which would assure utilization of the system. Several system lengths had been proposed in the past. The report Toll Roads and Free Roads had suggested 14,336 miles for a national toll road system and 26,700 miles for the interregional system; the Public Roads Administration increased the interregional system to 29,330 miles, so that it incorporated the principal highways of the strategic highway network of 1941. However, the National Interregional Highway Committee elected to evaluate various lengths to determine the optimum system length.

The objective of selection was "to incorporate, within each of the several mileage limits adopted, those principal highway routes which could reach to all sections of the country, form within themselves a complete network, and jointly attract and adequately serve a greater traffic volume than any other system of equal extent and condition."¹¹

The Recommended Interregional Highway System

The system, which had the highest average daily traffic volume for the number of miles included, proved to be one of the shorter system alternatives [Refer to Figure 5, p.32]. The recommended system included 29,450 miles of rural highway (0.99 percent of the 2,964,677 miles of rural road) and 4,470 miles of urban highway (1.48 percent of the 303,040 miles of urban road) for a total of 33,920 miles (1.04 percent of the 3,267,717 miles of road in the United States). The interregional system included 950 miles (790 rural miles and 160 urban miles) in Indiana.¹² This amounted to 1.1 percent of the total highway mileage in the state, 1.03 percent of the Indiana rural mileage and 1.61 percent of the Indiana urban mileage.

The recommended system connected all cities of 300,000 or more in population, 59 of 62 cities in the 100,000 to 300,000 population range, and 87 of 107 cities in the 50,000 to 100,000 population range. A 48,300-mile system reached 91 of 107 cities in the 50,000 to 100,000 population range. If the system were increased to 78,800 miles, only four additional cities would have been served in the 50,000 to 100,000 population range. Only in connecting cities under 50,000 population did these two longer systems prove superior to the recommended 33,920 mile system. However, in reaching an increasing number of smaller cities, the longer systems suffered a loss in the average daily traffic volume served by the system as a whole. The recommended system failed to connect Akron, Canton and Youngstown in the 100,000 to 300,000 population range; however, the system passed in close proximity to these cities and linked all but ten of the 140 metropolitan districts (urban areas of 50,000 or more population) as defined by the 1940 Census.

Although the recommended system connected only 54.5 percent of the cities of 10,000 or more in population, the

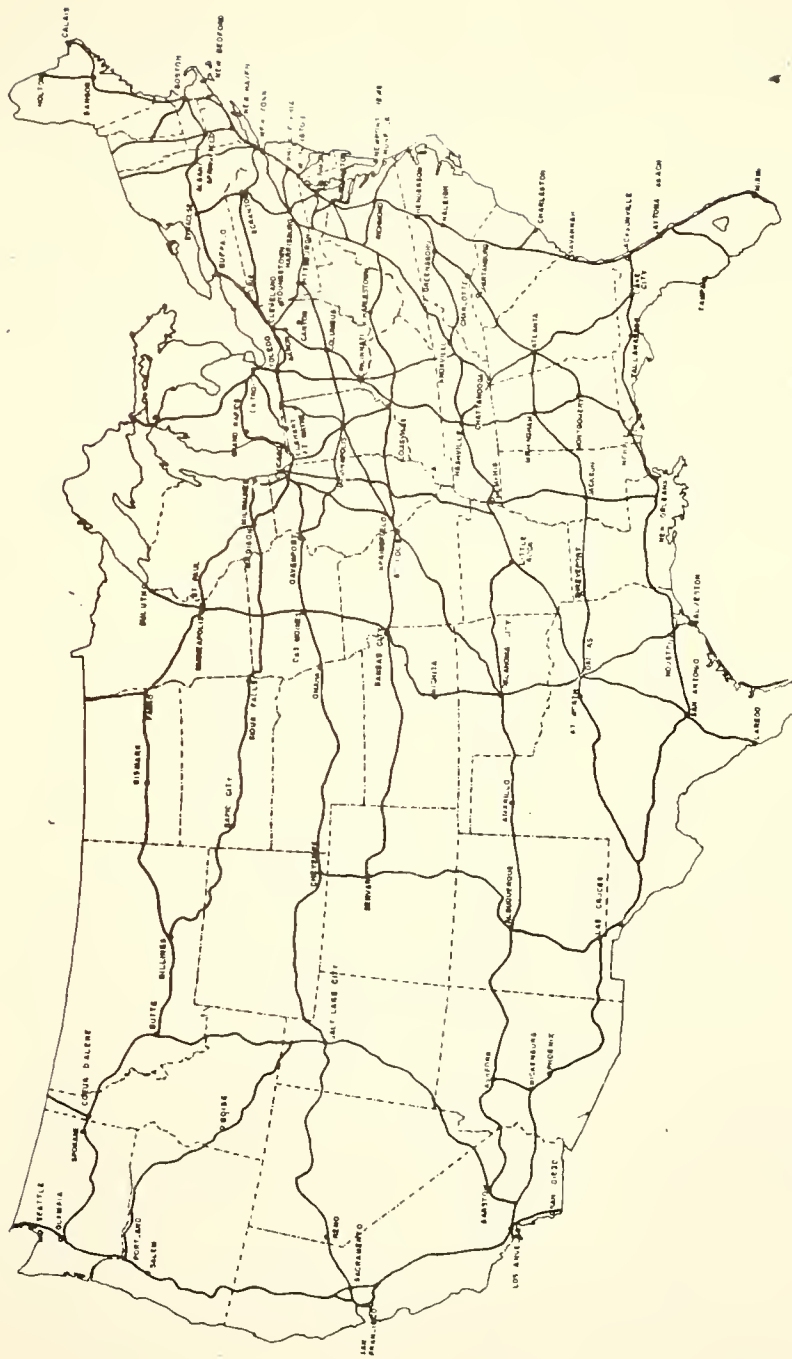


FIGURE 5. THE GENERAL LOCATION OF ROUTES OF THE RECOMMENDED INTERREGIONAL HIGHWAY SYSTEM¹³ (33,290 MILES)

aggregate population of these cities amounted to 82.6 percent of the total urban population of the United States. To connect all cities of 10,000 or more in population would have required a system three times as long as the recommended system. The recommended system passed through 34.3 percent of the Nation's counties, yet served 45.2 percent of the rural population.

Truck traffic volume is generally greatest on highways serving industrial centers. The industrial cities connected to the preferred system accounted for 83 percent of the total value added by manufacturing.

The system passed through counties which accounted for 43.3 percent of the total farm value added. These counties averaged 46 percent higher in value added than those counties not included.

By county, the system served 68.7 percent of the registered vehicles in 1941; 696,773 of 1,053,063 vehicles registered in the State of Indiana in 1941 were in counties traversed by the interregional highway system.

There was a belief that surplus labor after the war could be utilized in the construction of the interregional system. This policy would hopefully prevent an economic recession after the war. The location of the system fell near major industrial concentrations where labor was expected to be released from war production.

The strategic highway network of the military included almost all the interregional system that had been proposed. Thus, the interregional system linked most of the military and naval installations and war industry concentrations. [Refer to Figure 6, p. 34].

Some of the most heavily traveled sections of highway were not included in the system because the traffic was local in nature; however, the most heavily traveled routes in a region were included in the interregional system. The most direct route was recommended between cities in

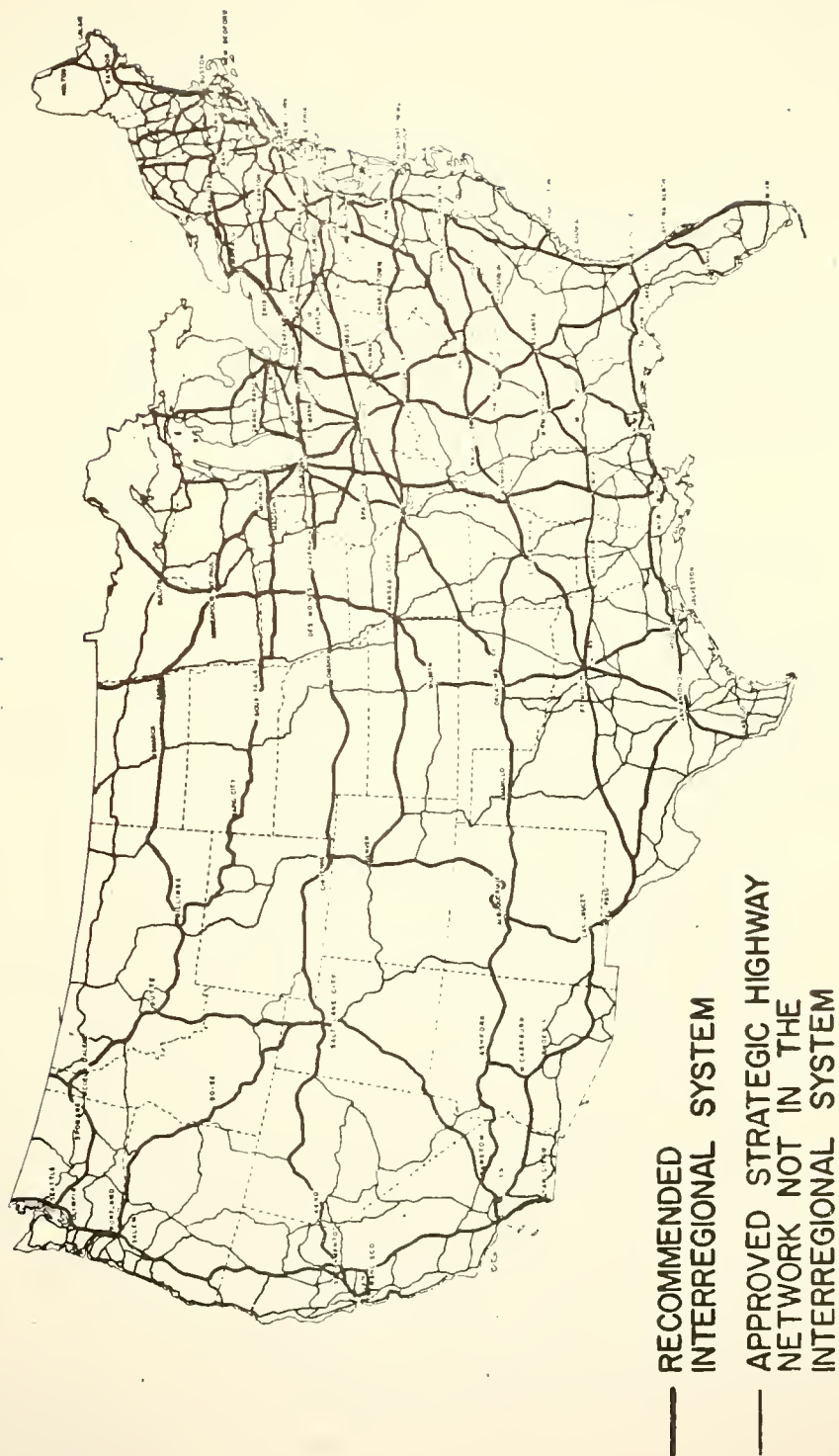


FIGURE 6. RELATION OF THE RECOMMENDED INTERREGIONAL SYSTEM TO THE STRATEGIC NETWORK OF MAY 15, 1941

order to hold down mileage on the system and to serve regional traffic in preference to local traffic. The average vehicle volume per day on the rural portion of the system was estimated to be 2,660; thus, the system would carry 16.79 percent of the rural vehicle-miles daily, based on 1940 data. If generated traffic were considered, the system would eventually carry one-fifth of the rural vehicle-miles even though the system would comprise only one percent of the total rural mileage in the United States.

Although the system followed land formation and principal rivers, topographic features were of secondary importance in locating the system. This was probably due to the fact that population had concentrated along the oldest transportation corridors, the rivers.

Selection of Routes for the Interregional System

"In selecting the routes to comprise the system and in determining the extent of the system to be recommended, the primary purpose was to select routes forming an integrated system of reasonably limited total extent which would join the principal centers of population and industry in each geographic region with centers of similar relative importance in other geographic regions, by lines as direct as practicable."¹⁴ The principal determinants in the selection of mileage for inclusion in the system were, therefore, interconnection of larger cities in all regions, accommodation of trips to smaller cities so far as practicable, and designation of a system of optimum length and maximum utilization.

The importance of interconnecting major cities was exhibited by the fact that eighty-six percent of all traffic on intercity highways had at least one trip end in an urban area, and that the most heavily traveled segments of the interregional system were within the influence zone

of urban areas. From past studies it had been found that the longer the trip the greater the proportion of trips having a trip end in an urban area, that traffic increased as the urban area was approached, and that transcity connections of the interregional system would be subject to traffic peaks.

Because travel on major highways was composed of both short and long trip lengths (eighty-five percent of all trips being less than twenty miles long), it was not practical from the standpoint of user service to utilize the most direct alignments between major urban areas. The routes were diverted from direct lines to serve smaller urban areas based on population and industrial importance.

To determine the optimum length of the system, several alternative lengths were compared to determine which would be utilized to the greatest extent. Route lengths of 14,300 and 26,700 miles described in Toll Roads and Free Roads; 29,300 miles, described in the June, 1941, issue of the Public Roads Magazine; 48,300 miles; and 78,800 miles were considered. The difference in lengths of the alternatives was due to the progressive addition of more routes to serve a greater area.

The smallest system omitted some of the cities of 300,000 to 500,000 in population and one city over 500,000 in population. The largest system connected a larger percentage of the urban areas of 10,000 or more in population.

The five alternatives were plotted, and a system of 29,300 miles was found to have the greatest average daily traffic volume. "If this value could be exceeded, it was conjectured that a maximum value might be obtained by a properly selected system of either 36,000 or 33,000 miles approximately, the mileages represented by other intersections of the straight lines of the graph."¹⁵ [Refer to Table 1 and Figure 7, p. 37]. The 36,000-mile system was developed by adding routes to the 29,300-mile system to

TABLE I. ESTIMATED URBAN, RURAL, AND TOTAL MILEAGE, TOTAL RURAL VEHICLE MILEAGE, AND AVERAGE DAILY TRAFFIC ON RURAL SECTIONS STUDIED, INCLUDING THE RECOMMENDED SYSTEM¹⁶

Mileage of Systems		Total rural vehicle mileage	Average daily traffic rural sections
Total Mileage	Mileage of rural sections		
Systems previously investigated:	Miles	Vehicle miles	Vehicles
14,300 miles	12,600	32,000,000	2540
26,700 miles	23,300	59,200,000	2540
29,300 miles	25,550	66,100,000	2590
48,300 miles	42,380	104,900,000	2480
78,800 miles	70,230	150,200,000	2140
Additional system tentatively investigated:			
36,000 miles	31,350	80,981,000	2580
Recommended system:			
33,920 miles	29,450	78,208,000	2660

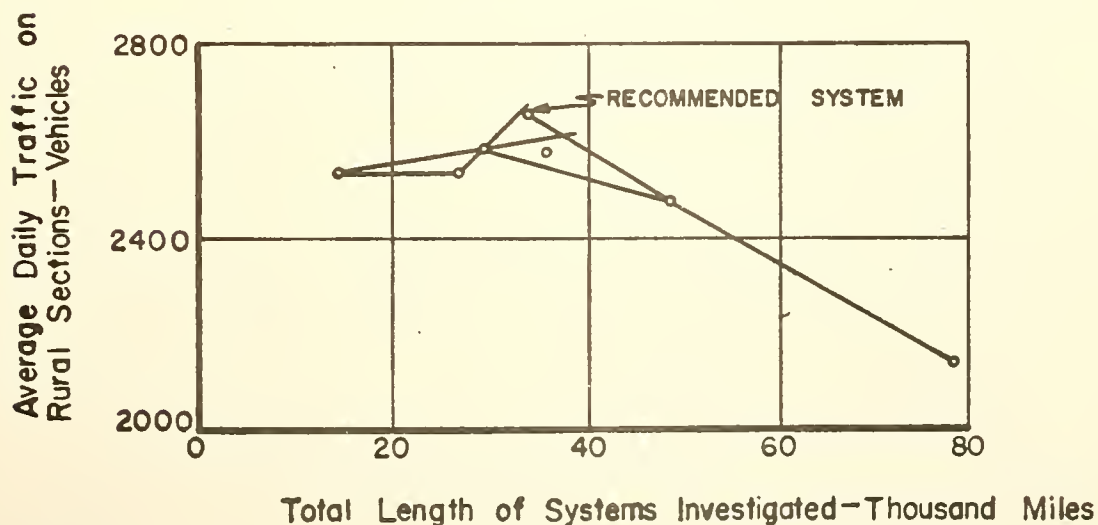


FIGURE 7. GRAPH EMPLOYED IN REFINING COMMITTEE'S SELECTION OF THE INTERREGIONAL SYSTEM¹⁷

reach important cities not reached by the smaller system and by eliminating a few of the less important routes. [Refer to Figure 8, p. 39]. However, since a lower average rural daily traffic volume resulted for the 36,000-mile system than the 29,300-mile system, routes were eliminated to form a 33,920-mile system which had an average rural daily traffic volume of greater magnitude than the smaller 29,300-mile system or the larger 36,000-mile system. This final system incorporated 0.99 percent of the Nation's total rural mileage and in 1941 served 16.7 percent of the total rural vehicle mileage.

The Interregional Highway Study concluded that the optimum system must connect as many large cities as possible to attract a large proportion of the total traffic, provide adequate routes to larger urban areas and most urban areas of 10,000 or more in population, and have a direct routing between the larger cities in the more densely populated sections of the Nation. Direct routing should not be sacrificed for a close approach to cities of less than 10,000 population (which might better be served by connecting routes from the system). The optimum mileage of 33,920 miles for the interregional system was measured along existing routes and based on the 1941 capacity of these routes. A total of 2,123 miles of the recommended system provided direct connections into and through urban areas of 10,000 or more in population. An additional 2,347 miles of the system passed through cities of less than 10,000 in population; these cities could probably be bypassed, resulting in a reduction of the overall system length. Since the recommended system did not include alternate circumferential or distribution routes, which would be required in larger cities for bypassing through traffic or for distributing and collecting local traffic, the national Interregional Highway Committee estimated that these alternate routes in urban areas would add 5,000 miles to the

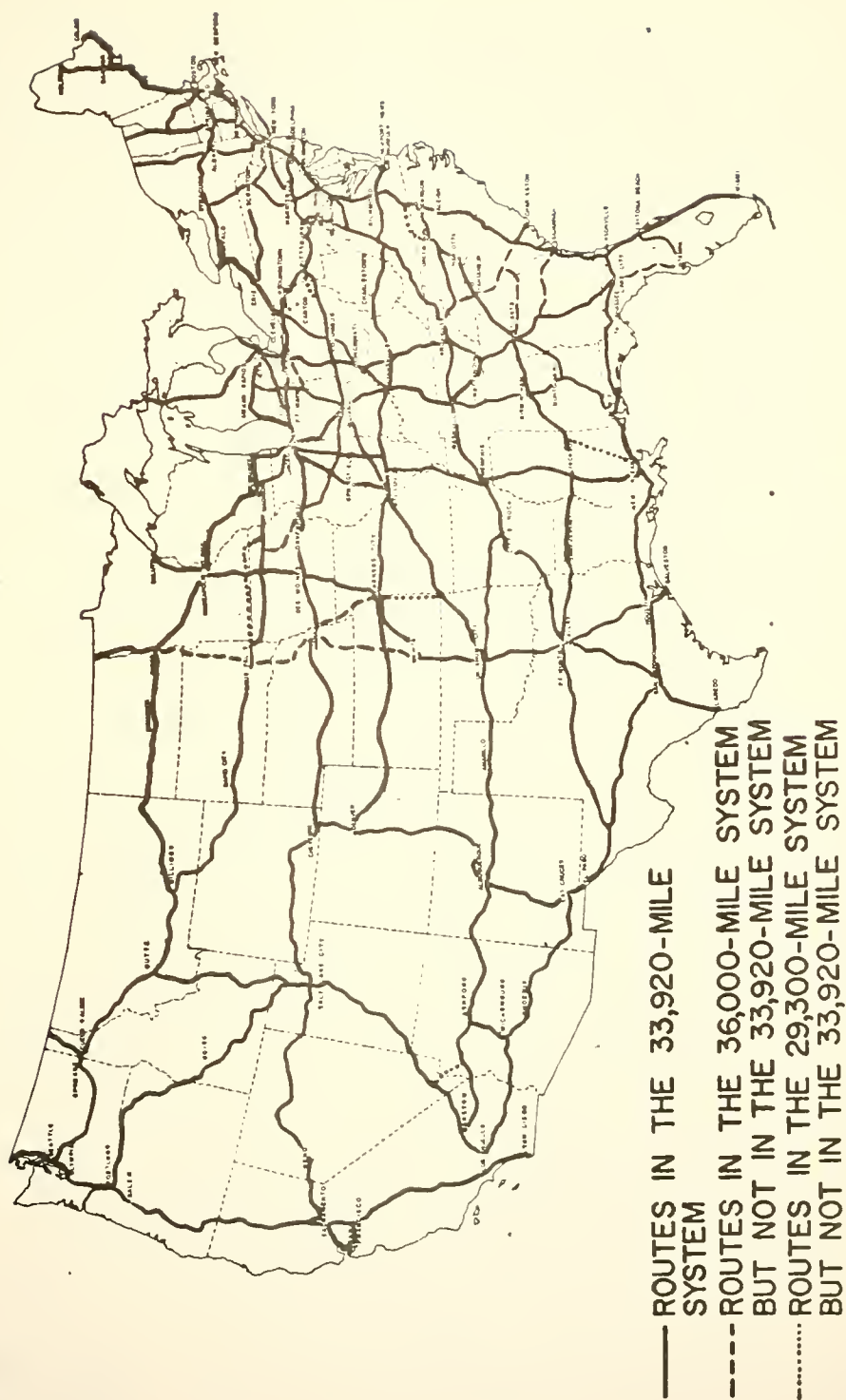


FIGURE 8. THE 36,000 -MILE INTERREGIONAL SYSTEM¹⁸

optimum 33,920-mile system. Hence, the recommended Interregional System would be approximately 39,000 miles in length.

Route Selection in Urban Areas

The Interregional study presented principles for the location of interregional routes in urban areas. These principles will be briefly summarized in this section and will be covered in greater detail in Chapter V.

The dominant principle was that the interregional routes should conform to the future shape of cities as well as to the existing urban pattern and their related urban travel patterns. Cooperation between State highway departments and local planning and highway agencies was stressed in the process of selecting routes in and about urban areas. Although bypasses provide considerable benefits to through traffic, a large portion of traffic has a trip end in urban areas; therefore, the advantages to bypassing for through traffic must be weighed against service to traffic with a trip end in the urban area. Because the interiors of urban wedges formed by traditional transportation routes were found to be less developed, the study suggested the location of urban segments of the Interregional System through the interior of these wedges to stimulate development and to assure a less costly right-of-way location. Circumferential routes were suggested for larger urban areas to serve intra-urban traffic with trip ends in the development wedges, to serve interurban traffic with an adequate collection and distribution system, and to serve through traffic with a bypass facility. Major traffic generators and mode inter-faces based on future traffic patterns were to be considered in the route location process. The location and number of intersections and grade separations were also considered to be important in locating the route. Compatibility with changes in the existing urban pattern and with the urban

transportation plan was considered essential; the route location plan was to be conceived in relation to a desirable future urban development pattern.

Access Limitation

Because the Interregional System was to serve through traffic, the system was to have preference over all intersecting routes. To insure this objective, the study recommended that all routes of the system be legally designated as limited-access highways. "This designation will empower administrative authorities, wherever and whenever necessary for the convenience of express traffic and the promotion of safety, to deny access to the interregional highways from abutting lands or control or limit such access as may be found desirable, and similarly to deny or limit access, as desirable, from other public roads."¹⁹

In sparsely settled areas, all properties might have access on lightly traveled rural interregional routes provided the point of access was controlled to maintain the integrity of the express route and to insure safety. Minor rural roads were to be closed and their traffic diverted to other roads which were retained across the interregional highway. At-grade intersections were considered acceptable on light to moderately heavy volume sections of the interregional system in rural areas. Deceleration and acceleration lanes, refuge islands and channels were required for at-grade intersections. For heavily traveled routes, complete grade separation and complete prohibition of access to abutting land was required. Service roads were to be built for those denied access to the system, but who previously had access to the route.

When local routes to the center of the city were adequate, access to the interregional facility by local traffic was to be denied. The Interregional System was to

serve primarily interregional (interurban, through or long distance) traffic and secondarily local traffic.

In 1944, public law gave the owner the right of access to all public roads; however, laws to restructure this access right were needed in most states if the intent of the interregional system were to remain.

Acquisition of Rights-of-Way

The National Interregional Highway Committee strongly recommended the creation of a revolving fund for advance right-of-way acquisition. This would expedite the purchase of land for future public construction prior to development in these areas. This would forestall increased condemnation costs and higher costs in time and money for acquisition of the land. Many existing State land acquisition laws also needed revision to speed up acquisition procedures.

When extensive realignment was needed for the improvement of a highway, it had generally been found cheaper to acquire entirely new right-of-way and to relocate the route.

A block wide acquisition concept was considered desirable in urban areas to insure service roads for property which faced the facility, to maintain existing utilities, and to provide adequate right-of-way width for the interregional facility.

Excess acquisition for future widening was sanctioned by law in a few states; however, laws were needed in most states to acquire adjacent land for future widening, to protect the integrity of interregional highways from incompatible land uses, and to dispose of land no longer needed. The use of police power to control roadside land use was suggested as a possible alternative to outright acquisition of abutting land.

Design of the Interregional System

The Interregional Study recommended landscaping policies that included preservation of the roadside environment, utilization of screening to conceal objectionable roadside conditions and to conceal the highway from residential development, and location to fit topographic contours. Trees were to be preserved where possible, and "the recreation of a natural foreground environment in harmony with the distant view" was emphasized as opposed to regularly spaced plantings which are monotonous and distracting.²⁰ In the acquisition of right-of-way, consideration was to be given to the width necessary to prevent encroachment and to protect and enhance the view from the highway. The objectionable uses to be screened also included signboards. Great emphasis was placed on the use of landscaping and the reduction of slopes to improve drainage and reduce erosion. Variable width medians and separate alignments were suggested for divided highways when terrain and cost warranted such treatment.

The Interregional Study design recommendations included an adequate design for vehicle volumes twenty years after the date of initial construction, for vehicle weights of 18,000 pounds per axle, and for dimensions anticipated twenty years hence. For rural sections, the recommended design speed was 75 mph for auto and not less than 60 mph for trucks in flat terrain, and not less than 55 mph for autos and 35 mph for trucks in difficult terrain; sufficient design capacity was suggested so that the running speed did not fall below 50 mph, except during infrequent peaks. For urban sections (defined as a length of highway at least one mile long with intersecting roads a maximum of one-quarter mile apart), the design speed was to be not less than 50 mph for autos and 35 mph for trucks with sufficient design capacity so that the running speed did not fall below 40 mph, except during infrequent peaks. Other requirements were adequate shoulders for disabled vehicles, and all road surfaces,

pavements and structures capable of supporting recommended weights. The report suggested that facilities should be elevated only when no other alternative was feasible. Depressed facilities may require more right-of-way, may necessitate more utility relocation, and may cause more drainage problems; nevertheless, they were considered more pleasing aesthetically and a better interface with the urban environment.

Constructing the Interregional System

An inventory of the physical conditions of existing highways, which closely conformed to the anticipated alignment of the Interregional System, revealed that few rural roads and almost no urban streets were adequate by Interregional design standards. Less than one percent of the rural bridges were adequate for twenty-ton shear and sixteen-ton moment loadings and had a vertical clearance of fourteen feet. A slight majority of the highways had high type pavement; however, most highways were insufficient in width (twenty-four feet for 1000 to 3000 vehicles per day and four twelve-foot lanes for 3000 to 10000 vehicles per day) and alignment.

The principle of minimum rate and indispensable order of construction was utilized to determine the desirable order and rate of construction. This principle states that "Obsolescence of the existing roads will thus determine a minimum rate at which the interregional system should be constructed, and it may be stated as a general principle, that - Whenever an existing highway conforming approximately to a route of the interregional highway system shall require reconstruction, by reason of the deterioration of its surface or other incapacity, the highway should be reconstructed only in the location and to the standard of design necessary to make it an acceptable link in the designated interregional highway system."²¹ At this minimum rate of reconstruction,

it would require nearly twenty years to upgrade the system; and many of the lighter pavements reconstructed to inter-regional standards would require reconstruction before the entire system had been upgraded. If construction of the system were to utilize the manpower and industrial capacity released after the war, as the President suggested, the rate of reconstruction would have to undoubtedly exceed the minimum. It was also considered desirable to exceed the minimum rate of reconstruction to realize earlier the benefits of safe and unobstructed traffic flow. The study found that the longer the construction was delayed, the greater the amount of construction required for a specific time period. This was due to the fact that the highways were becoming deficient with respect to Interregional design standards at an increasing rate.

If the recommended system was not designated immediately, obsolete sections of the system would not be replaced to standards suggested for the Interregional System. An immediate decision was also necessary if post war excess employment was to be utilized.

Financing the Interregional System

Based on the accepted principle of reconstruction, it would take approximately twenty years to complete the system. Although the total cost of the system would exceed that of ordinary construction, increased benefits to the user were anticipated.

In 1941, approximately twenty-one percent of the rural mileage of the system carried less than 1000 vehicles per day; these sections of the system were estimated to cost \$40,000 to \$60,000 per mile. Thirty-two percent of the rural mileage of the system carried 1000 to 2000 vehicles per day and were estimated to cost \$50,000 to \$70,000 per mile to upgrade the highway to the proposed standards.

Twenty-one percent of rural mileage carried 2000 to 3000 vehicles per day; there was a great variation in cost for these sections because the upper range might require a four-lane divided highway. Such highways would be required for over thirty percent of the rural mileage and were definitely required for volumes of 3000 to 15,000 vehicles per day. The estimated cost for rural four-lane divided highways varied from \$100,000 to \$700,000 per mile.

There was a greater variation in estimated construction cost for urban sections of the Interregional System than the rural sections. Construction cost for urban sections did not vary directly with traffic volume since right-of-way costs probably accounted for a larger proportion of the cost variation. Thus, no estimate of the cost of the system was made for the urban mileage.

The proposed Interregional program had no parallel in any other fields of public construction. A composite program with other public works projects was suggested as in accordance with the principle of providing for the advance planning and regulated construction of needed public works for the stabilization of industry and the alleviation of unemployment.²²

The Committee analyzed records of construction for prior years to determine the relationship between total construction volume and the national income. The research revealed that the volume of public and private construction, including work relief and maintenance, was closely tied to fluctuations in the national income. Furthermore, private and public utility construction expenditures appeared to be indicators of the health of the national economy. In the early thirties, public construction expenditures did not vary with the national economy, and increases in public construction expenditures failed to offset declines in the private sector resulting in an unstable economy. Over a twenty-eight year period from 1915 to 1942, the ratio of

total construction to national income averaged 14.7 percent annually. Since maintenance of this relationship appeared to insure a stable economy, public construction expenditures must offset any decrease in private construction expenditures to maintain economic stability. Thus, the principle of employing public works to stimulate a waning private economy appeared sound.

A review of Federal and non-Federal expenditures on highways over the twenty-eight year period from 1915 to 1942 revealed that the average annual expenditure was \$1,278 million (2.1 percent of national income) for highway construction and maintenance by all governments. The Federal government accounted for \$121 million (0.2 percent of the national income) of the average annual highway expenditure. Local governments spent \$715 million (1.1 percent of the national income) on highway construction and \$442 million on highway maintenance on an average annual basis. [Refer to Table 2, p. 48]. A closer analysis of the expenditure data for 1931 to 1934 revealed that Federal highway expenditure increases were more than offset by local government reductions in highway expenditures; subsequently, the increase in Federal highway expenditures failed to fully stimulate the waning economy in the early thirties. To prevent the nulification of the proposed Federal post war effort by states, matching funds would be required from the States, and the States would be required to maintain the highways built.

Based on the 1939-42 expenditure period and Federal work relief, the study suggested that \$750 million would have to be spent annually on highway maintenance to maintain a stable national income. Maintenance expenditures on highways would have to be greater the first post war years to overcome the maintenance deferred during the war years. Approximately \$15 billion was to be spent annually for all construction and maintenance, both public and private. Of

TABLE 2. CLASSIFICATION OF PUBLIC HIGHWAY EXPENDITURES²³

Period	National annual income million dollars	Public construction, excluding work relief—annual average						Public maintenance, excluding work relief—annual average					
		Federal ^a			Non-Federal			Highway ^b			Other ^c		
		million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income
1915-18	43,445	0.5	0.001	606	1.4	301	0.7	343	0.7	167	0.4	117	0.3
1919-22	61,383	52	0.1	400	0.6	634	1.0	539	0.9	314	0.5	167	0.3
1923-26	69,145	85	0.1	95	0.1	872	1.3	868	1.3	434	0.6	202	0.3
1927-30	75,567	83	0.1	141	0.2	1214	1.6	1066	1.4	581	0.8	168	0.2
1931-34	50,835	212	0.4	302	0.6	722	1.4	532	1.0	462	0.9	104	0.2
1935-38	63,613	250	0.4	830	1.3	546	0.9	125	0.2	499	0.8	115	0.2
1939-42	90,083	165	0.2	4114	4.5	712	0.8	348	0.4	640	0.7	143	0.2
1915-42	64,867	121	0.2	927	1.5	715	1.1	543	0.8	442	0.7	145	0.2
1931-42	68,177	209	0.3	1749	2.6	660	1.0	335	0.5	533	0.8	120	0.2

Period	Public construction and maintenance, excluding work relief—annual average				Federal work relief—annual average				Total public construction, maintenance, and work relief—annual average					
	Highway		Other		Highway		Other		Highway		Other		Grand total	
	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income	million dollars	% of National income
1915-18	468.5	1.1	1046	2.4					468.5	1.1	1046	2.4	1514.5	3.5
1919-22	1000.	1.6	1106	1.8					1000.	1.6	1106	1.8	2106.	3.4
1923-26	1391.	2.0	1165	1.7					1391.	2.0	1165	1.7	2556.	3.7
1927-30	1878.	2.5	1375	1.8					1878.	2.5	1375	1.8	3253.	4.3
1931-34	1396.	2.7	938	1.8	89	0.2	84	0.2	89	0.2	1022	2.0	2507.	4.9
1935-38	1295.	2.1	1070	1.7	533	0.8	531	0.8	533	0.8	1601	2.5	3429.	5.4
1939-42	1517.	1.7	4605	5.1	427	0.5	378	0.4	1944.	2.2	4983	5.5	6927.	7.7
1915-42	1278.	2.0	1615	2.5	150	0.2	142	0.2	1428.	2.2	1757	2.7	3185.	4.9
1931-42	1402.	2.1	2204	3.3	350	0.5	331	0.4	1752.	2.6	2535	3.7	4287.	6.3

^aRepresents Federal expenditures only on cooperative work.^bSubstantially all highway maintenance expenditures are by State & local governments.^cIncludes Federal maintenance expenditures.

this total, seven billion dollars were for public construction and maintenance; this included three and a half billion dollars for highway construction and maintenance. This expenditure was above any previous high in highway expenditures. However, the Interregional System was expected to absorb the excess over normal expenditures, and in no case was the total highway expenditure to drop below three billion dollars annually.

Using the three billion dollar highway expenditure figure, two and a quarter billion dollars would be available for construction after the three-quarters of a billion dollars had been subtracted for maintenance. As the Interregional system would handle one-fifth of the total vehicle-miles, it was to receive \$450 million annually for construction. The study suggested that an even greater proportion of the total highway expenditures would be desirable because the interregional routes were in need of more improvement and yielded a greater return of benefits as well as greater road user tax earnings.

Road user tax earnings for the system were expected to be double the cost of the rural sections of the system and triple the cost of the urban sections of the system. For the above reasons, the Committee recommended a higher priority for the Interregional System and considered an expenditure of at least thirty percent and preferably a third of all highway construction expenditures on the system justified. This would amount to \$750 million instead of \$450 million annually for the system; \$500 million of the total was to go for urban sections of the system. The Committee felt the higher priority for the interregional system would not jeopardize essential improvements on other highways.

Conclusion

From a physical inventory of existing highways that coincided with the proposed interregional highway system, few rural roads and almost no urban roads met the desired interregional highway design standards. As the interregional system spanned almost all the States and reached the centers of greatest anticipated post war employment needs, improvement of the system was presented as a means to utilize the excess production capacity after the war. Hence, the National Interregional Highway Committee recommended that the interregional construction program be initiated upon the cessation of hostilities, that early legal revisions be made to insure prompt implementation of the program, and that an annual expenditure of \$750 million be appropriated.

The expenditure rate was based on the level of expenditure on construction needed to stabilize the economy. Although designation and development of the interregional highway system was considered essential to the future growth and defense of the nation, the report emphasized the construction of the system as a means of preventing the economic slump that had followed previous wars.

The study did not make a detailed estimate of the total cost to improve the interregional system. Assuming the system was constructed at the rate at which existing sections become obsolete, the study determined that it would take twenty years to construct the interregional system. Based on the suggested rate of expenditure, nearly fifteen billion dollars would be spent to upgrade the system over a twenty year period. Nevertheless, the study failed to determine the actual cost of correcting deficiencies in the system.

Congress responded in 1944 with the designation of the 40,000-mile National System of Interstate Highways, but appropriated no funds specifically for the improvement of the System. Subsequently, construction of the Interstate

System failed to keep pace with the increasing traffic needs in the post war period.

The First Completion Cost Estimate

In 1948, Congress directed the Bureau of Public Roads to report on the status of improvement of the National System of Interstate Highways, the potential needs for improved highways for national defense, and current conditions and deficiencies of the general highway system in order to supplement a similar report entitled Highways for the National Defense dated February 1, 1941. The final report, Highway Needs of the National Defense, was prepared in close cooperation with the State highway departments and presented to Congress in 1949.

In 1948, the Interstate system carried one-fifth of the rural vehicle miles and one-tenth of the urban vehicle miles, yet comprised approximately one percent of the total road mileage. The military had concluded that the Interstate System included in its rural sections the roads of greatest strategic importance. The urban sections of the System were considered just as essential to defense needs.

Much of the rural road mileage and a substantial portion of the urban road mileage improved during the past forty years was found to be seriously obsolete. "Any complacency we may have as to the present adequacy of these major roads to serve in peace and in war (was) shattered by the evidence presented."²⁴ In 1948, the average age of the proposed Interstate pavements was twelve years and the average age of Interstate roadbed was seventeen years. After ten years of the proposed twenty year rehabilitation and replacement program, the surfaces on the unreconstructed portions of the Interstate would average twenty years old and their roadbeds at least twenty-five years old.

The increasing obsolescence would be brought about by the failure of proposed highway improvement to keep pace with traffic growth. The most serious deficiency of the highways was their lack of capacity to provide for the demands of an ever increasing number of registered motor vehicles. As traffic was concentrated on the Interstate System, it was considered the most seriously deficient system in the highway network, especially in urban areas. These inadequacies were also found to extend to the remainder of the highway network. The report stressed the fact that a general upgrading of arterial highway standards was needed immediately and had been long overdue. The Bureau of Public Roads recommended that the Interstate be among the first considered for improvement.

The Interstate System was found to be seriously deficient in regard to sight distance, width of pavement and shoulder, and bridges. Alignment problems could only be corrected through major relocations. If the rural sections of the System had been improved in 1948, many lives could have been saved. The savings in time alone at one cent per minute would have amounted to approximately four-fifths of the capital cost of improvement.

To merely correct the known critical deficiencies to tolerable standards, a capital investment of \$11,260 million was required for the System based on 1948 construction prices. Of the total cost, \$5,293 million was needed in urban areas of 5000 or more in population. To improve the System for adequacy twenty years hence and to controlled access standards rather than tolerable standards would greatly increase the capital investment. In addition, the cost estimate did not include the cost of improvement of the 2,300 miles of urban feeder routes, yet to be designated.

Although the total capital improvement costs exceeded the revenues of a single year, each year's delay in improving the System would put off possible benefits that

much longer. The study suggested that \$500 million was needed annually to bring the System up to adequacy in twenty years, which was considered the longest reasonable time span. The importance of the System to the economy and national defense probably justified a more rapid improvement rate. An increased expenditure rate was possible through deficit financing amortized over twenty years; the interest of which would be more than equaled by the benefits thus derived.

The report further recommended that Federal aid be continued on other systems to overcome their deficiencies, that additional funds be earmarked for expenditures on the Interstate to insure its improvement and that the Federal share of the Interstate construction be more than the normal fifty percent of the total project cost. The passage of a Federal law to permit future allotment of Federal funds to retire indebtedness incurred by a State in accelerating the Interstate improvement program would prevent this plan from discouraging States from accelerating improvement on their own.

Status of Interstate Improvement

By 1948, 37,800 miles of highway had been designated for inclusion in the Interstate. The system included 5,969 miles of urban streets (3,778 miles of urban streets in urban areas of 5000 or more in population and 2,191 miles of urban streets in incorporated areas of less than 5000 in population). This mileage was two percent of the total 316,536 miles of urban streets, carried eleven percent of the urban vehicle miles in 1948, and averaged 9500 vehicles per day as compared to other urban streets which averaged only 1000 vehicles per day. The 31,831 rural miles of the System consisted of eleven percent of the total 3,009,617 miles of rural roads, carried seventeen percent of the

rural vehicle miles in 1949, and averaged 2915 vehicles per day as compared to 1295 vehicles per day for the Federal Aid Primary System and 1155 vehicles per day for other roads in the State highway systems. Twenty-seven percent of the rural vehicle miles on the System could be attributed to out of state vehicles. In 1940, the Interstate served 65% of the total urban population. All cities of 250,000 or more in population, 49 of the 55 cities in the 100,000 to 250,000 population range, 69 of the 107 cities in the 50,000 to 100,000 population range, and 2538 smaller towns and urban places were served by the Interstate System. The System also crossed 1160 of the 3076 counties of the nation and served fifty percent of the rural population.

A 1948 physical inventory of the Interstate System included the type and age of the pavement and roadbed, the width of pavement and shoulders, other geometric features, and the capacity and clearances of bridges. The inventory of road surface revealed that 24 miles were unsurfaced, 144 miles were gravel, 4990 miles were bituminous, and the remainder high type pavement. [Refer to Table 3, p.55]. The average age of these surfaces was twelve years old; and the average age of the base was seventeen years old, giving the System an alignment typical of the year 1932.

The inventory of rural surface widths revealed that less than twenty percent of the two-lane rural highways had twenty-four foot pavements, and that only 2,540 miles of rural highway had four or more lanes of which only 1484 miles were divided [Refer to Table 4, p.55]. Only a third of the System had eight-foot shoulders. On the rural portion of the System, curvatures of greater than three degrees occurred at 21,869 points or approximately every one and a half miles. Since only curves less than or equal to three degrees were negotiable at 70 mph, a very small portion of the System had an alignment adequate for 70 mph; 2,770 miles of the System had grades greater than the preferred three percent.

TABLE 3. INVENTORY OF INTERSTATE MILEAGE, TYPE OF PAVEMENT AND CLASS OF AREA²⁵

(IN MILES)

Type of Pavement Class of Area	Unsurfaced	Low Type Surface (Gravel)	Intermediate Type Surface (Bituminous)	High Type Surface (Bituminous - Concrete, Portland Cement)	Total by Class of Area
Urban	0	5	417	5,547	5,969
Rural	24	139	4,573	27,095	31,831
Total by Pavement Type	24	144	4,990	32,642	37,800
					Grand Total

TABLE 4. INVENTORY OF INTERSTATE MILEAGE, SURFACE WIDTH BY CLASS OF AREA AND TYPE OF FACILITY²⁶

(IN MILES)

Type of Facility Width	Urban Sections	
	1-Way	2-Way
>60'	168	447
40-60		1,747
30-40		1,011
20-30	835	2,069
<20	21	
Total by Type of Facility	1,390 (695)	5,274
Total Urban as if 2-Way	5,969	

Type of Facility Width	Rural Sections (Surfaced Only)			
	2-Lane	3-Lane	4-Lane Undivided	4-Lane Divided
24'	5,229			
22-24	4,694			
20-22	11,637			
18-20	5,868			
<18	241			
Total by Type of Facility	27,669	1,607	1,056	1,484
Total Rural	31,816			

Stopping sight distances were inadequate on 2087 miles of the System, and 7,324 miles of the 29,276 miles of two- and three-lane roads lacked adequate passing sight distance. Very little of the system was grade separated; this implied a high degree of conflicts and delays at intersections. Only one-tenth of the bridges on the System had the desired H20-S16 (a 36 ton semi-trailer truck) loading capacity and 677 of the 12,048 bridges had less than an H-15 (a 15-ton truck) loading capacity. Even though most of the bridges had adequate capacity for 1948 loads and adequate vertical clearances, many bridges had serious horizontal clearance problems and only 1863 of 10,050 bridges conformed to Interstate standards. In summary, the surface type and traffic volumes were consistent, but traffic volumes and surface width were very inconsistent. In other words, the 1948 deficiencies were primarily those of capacity.

From a safety viewpoint, the average rate of fatal accidents on the Interstate was 9.04 per 100 million vehicle-miles in 1941 as compared to 9.11 per 100 million vehicle-miles on all rural highways. Accidents which resulted in fatalities occurred at a rate of 10.94 per 100 million vehicle miles on the Interstate as compared to 10.66 per 100 million vehicle miles on all rural highways. The Interstate System appeared to have no better accident record than other high volume highways; however, as the Interstate carried a large percentage of the vehicle-miles, it accounted for a large portion of the absolute death toll.

Correcting the Deficiencies

American Association of State Highway Officials (AASHO) design standards had been adopted for the Interstate System in 1945. These standards called for adequacy of the highway for vehicle volumes and types predicted twenty years after the initial construction, for a 70 mph design speed, for a maximum of three degree curves, for a maximum of five

percent grades, for pavement and structures adequate to handle 18,000 pound axle loads, for bridges adequate to handle H20-S16 design loads, for twelve-foot lanes, and for the outlawing of all three-lane highways. The standards also required the control of access and the use of frontage roads if state laws lacked a controlled access provision. Grade separations were required for railroad crossings where there were more than six trains per day and for intersecting roads of 2000 or more vehicles per day. Finally, both directions of the Interstate were to be designed for the thirtieth highest hourly volume.

At the current rate of replacement, the study determined that it would take twenty years to build adequate highway surfaces. To merely correct the 1948 deficiencies in capacity on the Interstate would require the widening of 8,687 miles, the reconstructing of 14,283 miles through minor relocation, and the reconstructing of 11,891 miles through major relocation. This would shorten the System by 641 miles. Only 1900 rural miles and 398 urban miles of the designated 37,800 miles of the System required no improvement for adequacy in capacity as of 1948.

The total cost of Interstate improvement to 1948 adequacy was estimated at 11,266,400,000 dollars of which 5,293,400,000 dollars was for urban sections. The estimated cost of Interstate improvement in Indiana was \$139,233,370 for the rural sections (906 miles) and \$250,203,840 for the urban sections (159.4 miles). Although Indiana Interstate mileage was only 2.87 percent of total Interstate mileage, the Indiana proportion of the total System improvement cost was 3.46 percent. The study discovered that the cost per mile of improving the urban sections was 8.7 times the cost per mile of improving the rural sections and 8.5 times the cost per mile of improving the entire System. The cost of improvements on the Interstate came to 18.1 cents per vehicle mile in 1948, 0.9 cents per vehicle mile over a

twenty-year period if traffic remained at the 1948 level, or 0.7 cent per vehicle mile over a twenty-year period considering the anticipated traffic growth over that period.

Retrospect

This was the first study to evaluate the progress of improvement on the Interstate System since its designation by Congress in 1944. The study was also the first to determine the cost of overcoming the System's deficiencies. The report revealed that critical deficiencies still existed on the Interstate System and estimated that it would cost \$11,260 million to upgrade the System to adequacy for 1948. The study further suggested that a minimum of \$500 million annually was needed to bring the system up to adequacy in twenty years, which was considered the longest reasonable time span for improvement.

A shorter period for upgrading the System would result in greater economic and social benefits. The needs of national defense also required a more rapid improvement of the Interstate System. The report suggested that the rate of improvement could be advanced in time by borrowing capital which would be amortized over the twenty year construction period. The study also felt that the interest on such a loan would be more than equalled by benefits accruing to the highway user.

At the time of the study, Federal aid funds, authorized for the Primary and Urban Federal Aid Systems, were being allotted to projects on the Interstate System at a rate of approximately \$75 million annually. This amount was ten percent of the \$750 million estimate made by the Inter-regional highway study of 1944 and fifteen percent of the \$500 million estimate of this study. Hence, earmarking of funds was suggested to assure improvement of the Interstate System.

Because of the extraordinary interstate and national interests attached to the System, Federal participation in the cost of improvement at a ratio greater than the normal fifty percent was considered appropriate. If States should accelerate improvement of the System on their own, it was considered desirable that a Federal law permit the future allotment of Federal funds to retire the indebtedness incurred by the State in accelerating the System improvement.

Although this study estimated the total needs of the System, it had several shortcomings. The needs estimate was based on the cost to correct present (1948) deficiencies to tolerable standards rather than the cost to upgrade the System to controlled access standards adequate for vehicle volumes and types predicted twenty years hence. The cost estimate was restricted to the portion of the System which had been designated as of 1947. Another 2,300 miles of urban feeder routes remained to be designated, yet were excluded from the estimate. The cost estimate was also based on 1948 construction prices, and no adjustment was made for escalation.

One of the most basic assumptions of the study was later proved to be impractical. The study "considered that much of the System would be developed by reconstruction and widening of existing highways and by utilizing existing major bridges, although they might not in every case be conveniently located."²⁷ The needs estimate was founded on this basic assumption.

More Studies

The National Highway Study

In April, May and June of 1953, extensive hearings were held by the House Road Subcommittee on the status and future of Federal Highway programs. The hearings, termed

the "National Highway Study," made a comprehensive study and review of the highway problem. The major topics of the hearings included the recommendations of the 1953 Governors' Conference that the Federal Government relinquish the tax on motor fuel to the States and that the activities of the Bureau of Public Roads be curtailed; and the proposals of the possibility of placing Federal motor fuel taxes in a trust fund for highway purposes, the desirability of extending turnpikes and toll roads as well as an inter-continental superhighway, the desirability of Federal participation in highway maintenance, and increasing the funds available for the Interstate System.

Through the efforts of the Bureau of Public Roads, particularly the testimony of Commissioner Francis U. DuPont, the suggestion to disband the Bureau of Public Roads and to turn the Federal motor vehicle tax revenues over to the States was refuted. Utilizing the findings of the 1949 needs study, the Commissioner further stated that the Interstate System was essential to our defense effort and to our peacetime economy. Subsequently, he suggested that Congress apportion funds on a population basis to permit reasonable progress in improving the System, and that Congress specify a greater proportion of the total highway funds for improvement of the Interstate System.

The "National Highway Study" led to the enactment of the largest Federal aid highway program to date (1954). Nevertheless, subsequent appropriations for the Interstate System fell far below the actual needs.

DuPont's Informal Advisory Committee

When President Eisenhower decided to sponsor an enlarged and accelerated highway program and stressed the construction of the Interstate System, the Commissioner of the Bureau of Public Roads (Francis U. DuPont) formed an

informal advisory committee to discuss the implementation of such a program. The group considered probable program costs and means of financing which varied from increased Federal road user taxes to revenue bonds to the recovery of a share of the capital gain and property enhancement accruing to property adjacent to the System. To insure the participation of all States in the Interstate program, the advisory committee recommended Federal participation in the neighborhood of ninety percent. The committee also felt that there should be no compromise in the matter of full access control for the Interstate System, and that the Interstate program should be planned and financed in such a way that all States finished the System simultaneously. Many of these were to be considered in A 10-Year National Highway Program which was subsequently developed.

Needs of the Highways from 1955 to 1984

In the Federal Aid Highway Act of 1954, Congress again requested the Bureau of Public Roads to report on the feasibility of modernizing the highway network through toll financing and on the cost of modernizing the Nation's highways.

Many advocated toll financing as a ready solution to the problem of financing highway modernization. These advocates were refuted by the study Progress and Feasibility of Toll Roads and Their Relation to the Federal-Aid Program which was presented to Congress in April 1955. The study determined that only 6,700 miles of highway could be feasibly financed through tolls, and reaffirmed the principle that roads built with Federal aid should be toll free. To prevent wasteful duplication, the report also recommended that toll roads meeting Interstate standards, having alternate parallel free roads, and coinciding with the Interstate routes be incorporated into the Interstate System.

The report entitled Needs of the Highway Systems, 1955-84 was presented to Congress in March of 1955. This study was a comprehensive investigation of National highway needs, the costs to meet these demands, and the financing to insure improvement. The findings of this report were incorporated in the document A 10-Year National Highway Program which is described in detail later in this chapter.

Highway Inadequacy

The 1955 to 1984 needs study estimated that the cost of needed construction necessary to modernize the nation's highways would amount to 101 billion dollars over the next ten years, and that an additional 25 billion dollars would be required for maintenance and administration during the same period. The magnitude of highway needs represented by these figures was an accumulation of needs over many years.

Construction failed to keep pace with traffic increases after World War II; thus, as the demands for increased capacity grew, the highway deficiencies began to accumulate. "In needs studies made during the immediate post war period (1946-50), the rapid increase in highway usage was viewed by many as a temporary phenomenon - a leveling-off was anticipated in the predictable future. Even so, estimates of needs showed construction requirements of great magnitude."²⁸ In 1954, the leveling-off anticipated had not occurred, and forecasts for the future predicted a continuation of the present trend of increasing highway usage. In 1954, 58 million registered vehicles accounted for 557 billion vehicle miles of travel and it was estimated that there would be 81 million registered vehicles traveling 814 billion vehicle miles by 1965, a forty percent increase over 1954.

Economic studies based on the 1950 census indicated that the economy was enjoying vigorous growth, and that the trend was likely to continue. From 1954 to 1965, a fifty percent

increase in the Gross National Product was anticipated. The study further stated that an adequate highway network has always been essential to sustained economic growth.

There were factors other than traffic growth that led to the increasing inadequacy of the highway network. Increased vehicle weights, higher speeds and heavier axle loads had caused a serious deterioration of inadequately designed highways. The four year-moratorium on construction during World War II had prevented normal maintenance and replacement, resulting in further deterioration of the highway network. However, the failure to keep pace with traffic growth alone would have made the existing network obsolete.

The failure to control access on major highways led to the increasing functional inadequacy of the highway network. The study also discovered that the accident rate for full-access controlled facilities was forty-two percent of the accident rate for facilities with no access control, and the fatality rate for full-access controlled facilities was thirty-six percent of the fatality rate for facilities with no access control. The cost of an accelerated highway program could be justified by a savings in accident costs and lives alone.

Although these factors led to the increasing inadequacy of the highway network, the crux of the problem was highway construction financing. In the face of growing highway needs, a shortage of revenues for highway construction and maintenance since 1946 had created a dilemma for highway agencies. Although the expenditure of funds on high-type facilities with long service lives was a basically sound policy when faced with limited funds, the policy generated great dissatisfaction because other facilities were allowed to deteriorate. The alternative policy was an across the board make-do program characterized by short-term, stop-gap work in lieu of needed major improvements.²⁹ The latter policy provided temporary relief, not a cure.

Highway Improvement Estimate

Estimates were based on the cost of improving each highway system by 1964 to a condition adequate for its predicted traffic volumes and types in 1964 and in the case of the Interstate System 1974. Additional estimates were compiled on the cost to sustain adequacy for twenty years (1964-1984), assuming adequacy was reached in 1964.

According to the concept of development in the needs study, the entire Interstate System was to be improved in ten years (1955-64) to a level of structural (pavement) adequacy and sufficient lane width (an element of functional adequacy) for the traffic volumes and types predicted for 1974, and was to be otherwise (alignment, base, drainage, and right-of-way) adequate for thirty to forty years from the date of construction. After 1964 the Interstate System was to be maintained in sound structural and functional condition. Additional lanes could be added to the System as traffic needs warranted after 1974.

The Federal Aid Primary System (excluding the Interstate) was to be upgraded in ten years (1955-64) to a level of adequacy for the predicted traffic volumes of 1964. Specifically, any section improved was to have adequate lane width for ten years and other geometrics for thirty years from the date of construction. If sections became structurally or functionally inadequate after 1964, they were to be rebuilt according to the ten-year concept.

The improvement estimates for remaining systems were based on shorter service lives and lower types of surfaces.

In the estimate, the highest design standards for upgrading were, of course, established for the Interstate System. The design standards for upgrading became progressively lower as the importance of the system diminished. The Interstate in 1964 was to be structurally and functionally adequate for the traffic of 1974. For other principal systems, portions that were presently inadequate or were

expected to become inadequate by 1964 based on tolerable conditions were included in the estimate for replacement or reconstruction. For local roads and urban streets, there was great flexibility in tolerable standards by which roads needing improvement were determined. Hence, despite the fact that the Bureau of Public Roads developed a cost estimate guide based on 1954 construction costs to insure uniformity of the reporting of individual States, uniformity in the estimates made by individual States could not be assured.

The study also prefaced its cost estimate with several general statements. When evidence to support a need was fully lacking, the estimate was pared down so that it would not be questioned. This was particularly the case in urban areas where true needs greatly exceeded the prospects of meeting them. Hence, the estimates in this needs study generally reflected financial feasibility rather than anticipated needs.

Construction Needs for the First Ten Years. From the data of the individual States, the study estimated that \$101 billion would be needed to modernize the Nation's roads over a ten-year period. [Refer to Tables 5 and 6, p.66]. Indiana had reported that \$4,206 million would be needed to modernize its highways.

About fifteen percent of the 37,700 miles of Interstate System, as designated in 1954, was adequate according to the standards set forth by this needs study. No allowance was made in the cost estimate for an increase in mileage by the end of 1964, but a fifty percent increase in traveled lanes by 1964 was taken into consideration. The increase in traveled lanes would be needed to insure that the System had adequate capacity for 1974 traffic volumes. Two-lane highways were adequate for only 7000 miles of the System; 28,000 miles of the System would require four-lane divided highways and another 2,700 miles of System would require six or more lanes.

TABLE 5 1955-64 NATIONAL CONSTRUCTION NEEDS³⁰

(IN BILLIONS)

System ^{a,b}	Rural	Urban	Total
Interstate	12.5	10.7	23.2
Other Federal Aid Primary	19.9	10.0	29.9
Federal Aid Secondary, under State	10.1		10.1
Federal Aid Secondary, under Local	4.9		4.9
Total Federal Aid Secondary	15.0		15.0
Subtotal Federal Aid Systems	47.4	20.7	68.1
Other State Highways	3.7	1.8	5.5
Other Roads and Streets	13.3	13.9	27.2
Subtotal Non-Federal Aid Systems	17.0	15.7	32.7
Total All Roads and Streets	64.4	36.4	100.8

^a Figures include Hawaii and Puerto Rico; continental U.S. alone 100.3 billion.

^b Costs include right-of-way.

TABLE 6 1955-64 INDIANA CONSTRUCTION NEEDS³¹

(IN MILLIONS)

System	Rural	Urban	Total
Interstate	475	392	867
Other Federal Aid Primary	816	303	1,119
Federal Aid Secondary, under State	385		385
Federal Aid Secondary, under Local	362		362
Total Federal Aid Secondary	747		747
Subtotal Federal Aid Systems	2,038	695	2,733
Other State Highways	18	33	51
Other Roads and Streets	741	681	1,422
Subtotal Non-Federal Aid Systems	759	714	1,473
Total All Roads and Streets	2,797	1,409	4,206

Construction costs for the Interstate ranged from \$200,000 per mile for two-lane highways in rural areas to \$10 million per mile for multi-lane sections of six or more lanes in urban areas. The estimated construction cost for a four-lane divided highway varied from \$450,000 per mile in rural areas to \$1.6 million per mile in urban areas.

According to the States' estimates, the cost of construction on the Interstate would total \$23.2 billion during the first ten-year period. This figure did not take into account the expansion of the System to the legislative limit of 40,000 miles. However, most of the 2,300 miles of extensions would be in urban areas, and these costs were to a certain extent included in the cost estimates of other systems.

The amount of reconstruction and the cost estimates were less for each system as its importance diminished. Nevertheless, in absolute values, the cost of replacement and reconstruction was high. Seventy-five percent of the Federal aid system, excluding the Interstate, would require improvement over the next ten years. The overall mileage of the Federal Aid Primary System was also anticipated to increase to 201,000 miles (185,000 rural miles and 16,000 urban miles) by 1964. The Federal Aid Secondary System was expected to increase fifteen percent over the length in 1953 to a length of 530,000 miles in 1964. Other State highways were expected to increase from 86,000 miles (76,000 rural miles and 10,000 urban miles) to 114,000 miles (102,000 rural miles and 12,000 urban miles) in 1964; fifty-nine percent of this existing rural mileage and forty-seven percent of this existing urban mileage would require improvement. The mileage of other rural roads was expected to decrease 28,000 miles from 2,300,000 miles, and the mileage of other urban streets was anticipated to increase 28,000 miles from 320,000 miles by 1964. Fifty-four percent of this rural and forty-eight percent of this urban existing

mileage would also need improvement in the initial ten-year period.

Construction Needs for the Next Twenty Years. With an expanding population and a continually expanding economy, transportation needs would continue to grow after the level of adequacy had been reached in 1964. Thus, even though future needs would be hard to measure, the failure to plan for these future needs would result in the reversion of the highway network's adequacy to a level the same as 1954 in relative terms. "Simply to sustain the investment in the highway plant at the stage of development existing in 1964 would require substantial continuing capital outlays after 1964."³² The future worth of the \$101 billion investment in 1964 would be \$140 to \$150 billion in 1954 dollars. On the basis of a thirty to thirty-five year life of investment, it would require an average construction expenditure of \$4 billion or more annually merely to offset the depreciation. In addition, facilities wear out and require rebuilding. Provision would also have to be made for substantial upgrading to take care of further traffic growth. On this basis, \$114.4 billion would be needed for construction to maintain adequacy for the next twenty years (1965-84).

Needs for the Interstate System from 1965 to 1984 were expected to be less than half the needs for the first ten years; \$9.7 billion (\$5.1 billion in rural areas and \$4.6 billion in urban areas) would be needed to maintain adequacy from 1965 to 1984 compared to \$23.2 billion for construction for the first ten years (1954-1964). For the other systems the 1965 to 1984 needs were greater than those for the initial ten-year period. The difference between the Interstate and other systems was due to the fact that the Interstate System in 1964 would be adequate for 1974 traffic; whereas, the other systems in 1964 would be adequate only for 1964 traffic, implying that substantial upgrading would be required for the other systems after 1965.

Construction Expenditure. To meet all the highway construction needs in the initial ten years and to maintain the level of adequacy for twenty more years would require a \$215.2 billion expenditure on highways from 1955 to 1984. [Refer to Figure 9, p. 70].

The study suggested an expenditure rate of eight billion dollars per year for the first five years as the program got underway. An average expenditure of twelve billion dollars for the next five years was required as the program approached its peak and tapered off in 1964. For replacement and expansion of the system after 1964, the rate of expenditure would vary from \$4.3 billion in 1965 to \$7.5 billion in 1984.

A more uniform rate of expenditure would have appeared more consistent with overall economic policies according to the report. Nevertheless, the Interstate System should have first priority in any overall program, and the less urgent needs of the other systems might, therefore, be met more gradually.

The study reviewed the relationship between highway construction expenditures and the Gross National Product (GNP) to insure that expenditures reflected financial feasibility. In the 1920's highway construction expenditures averaged 1.2 percent of the GNP and gradually increased to a peak of 1.8 percent of the GNP in 1931. The proportion declined to a low of 1.2 percent of the GNP in 1935, and gradually rose to 1.7 percent in 1938. Thereafter, construction expenditures dwindled to a low of 0.2 percent of the GNP during World War II. The figure climbed to 0.8 percent of the GNP in 1949, and after 1952 it rose to 1.1 percent of the GNP in 1954. During the initial ten-year period of construction, the recommended rate of expenditure would vary from 1.2 percent of the GNP in 1955 to 3.0 percent in 1960 and 1961 to 2.1 percent in 1964; the average rate of

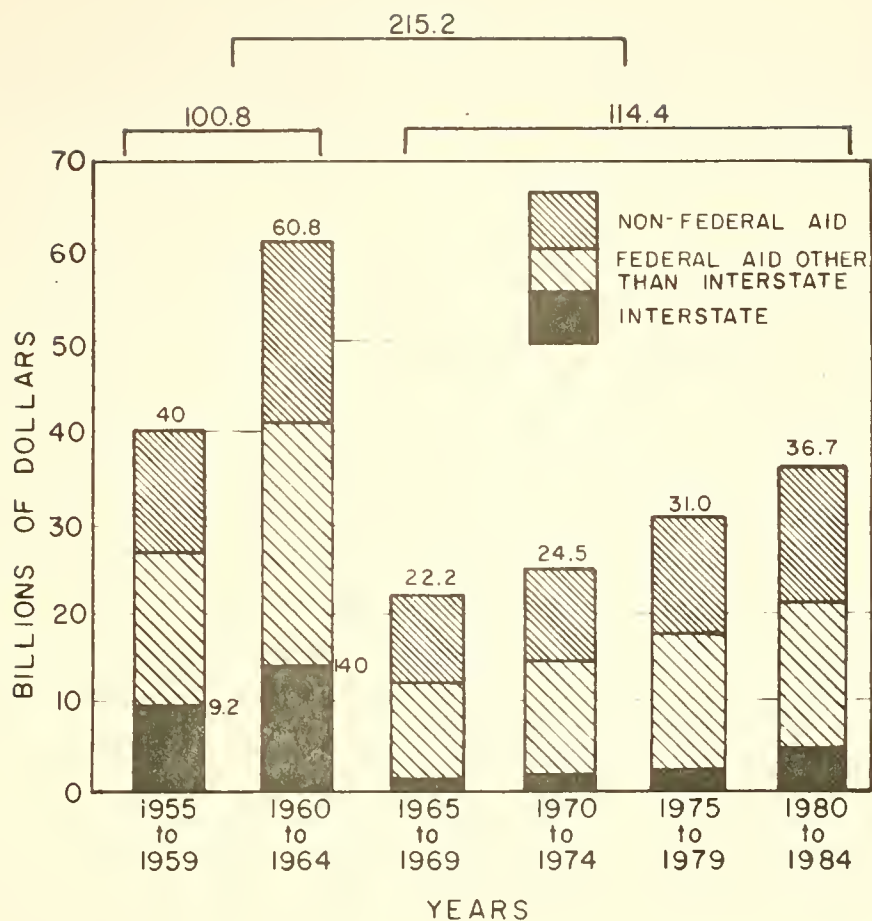


FIGURE 9. RATE OF EXPENDITURE BASED ON NATIONAL CONSTRUCTION NEEDS FROM 1954 TO 1984³³

expenditure for this ten year period was 2.4 percent of the GNP. An average of 0.8 percent of the GNP thereafter was required if construction needs for expansion and replacement were to continue at a fairly constant proportion of the GNP.

Maintenance and Administrative Needs and Expenditures.

The needs study also determined the maintenance and administrative costs needed to support the proposed construction program.

For the initial ten-year period, the study estimated that \$19.4 billion would be needed to maintain the highway network. The Interstate would account for \$700 million of the total maintenance needs for the first ten years. From 1965 to 1984, an additional \$48.8 billion would be needed to maintain the highway network; the Interstate share was only \$2 billion of the total needs for this twenty-year period.

The States had estimated that \$1.75 billion would be spent on highway network maintenance in 1955. For 1965 the States had estimated that a twenty-two percent increase in maintenance expenditures over 1955 would be necessary to maintain the adequacy of the network at the end of the initial ten-year stage of development. In 1984, total maintenance might be fifty-seven percent above the 1955 level for all systems combined.

The study inserted a note of caution on the Interstate maintenance estimates. "Using the data from the more experienced States as a guide, it (was) possible that, on a nationwide basis, the estimate of maintenance needs for the Interstate System as it (would) exist in 1965 and future years (were) understated by about 20%."³⁴

Administrative costs were estimated to be less than five percent of the combined total cost of construction and maintenance for all systems. The cost of administration for the initial ten years was determined to be \$1.3 billion for the Interstate System and \$5.9 billion for the entire highway network. For the twenty-year period between 1965 and 1984,

the administrative cost was estimated to be \$0.7 billion for the Interstate and \$7.8 billion for the entire highway network.

Total Needs and Expenditures. The total needs for the Nation's highway network from 1955 to 1984 were estimated to be \$297.1 billion out of which seventy-two percent was for construction, twenty-three percent was for maintenance and five percent was for administration. From 1955 to 1964, the need totaled \$126.1 billion out of which \$100.8 billion was for construction, \$19.4 billion was for maintenance and \$5.9 billion was for administration. From 1965 to 1984, the total need for all systems would be \$171.0 billion out of which \$114.4 billion was for construction, \$48.8 billion was for maintenance and \$7.8 billion for administration. The total needs averaged about \$9.9 billion annually over the thirty year period. In comparison only \$6.1 billion was spent in 1954. Figures 10 and 11 (p. 73 and p. 74) give a graphical description of the rate of expenditures to meet the needs of the entire network and the Interstate System alone.

Highway Improvement Financing

If the present structures and rates of highway user taxes were continued (even if consideration was given to the estimated increase in motor vehicle registration and motor fuel consumption over the next ten years) and if the current rates of expenditure on maintenance and administration were continued, the study estimated that \$47 billion in revenues would be available for highway construction from 1955 to 1964. Consequently, a \$54 billion deficit would have to be overcome if the estimated initial ten-year needs were to be met.

The needs for the subsequent ten-year periods were less than the initial ten-year period because the financing of

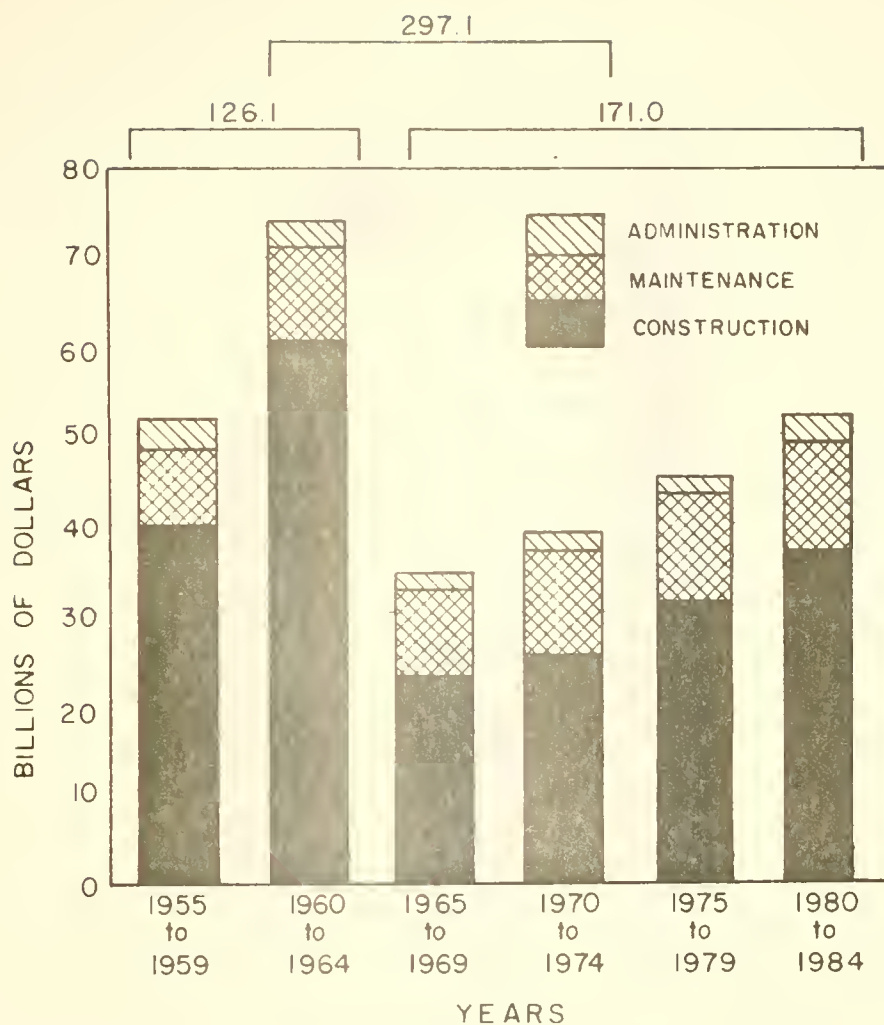


FIGURE 10. RATE OF EXPENDITURE BASED ON NATIONAL CONSTRUCTION, MAINTENANCE AND ADMINISTRATION NEEDS FROM 1954 TO 1984³⁵

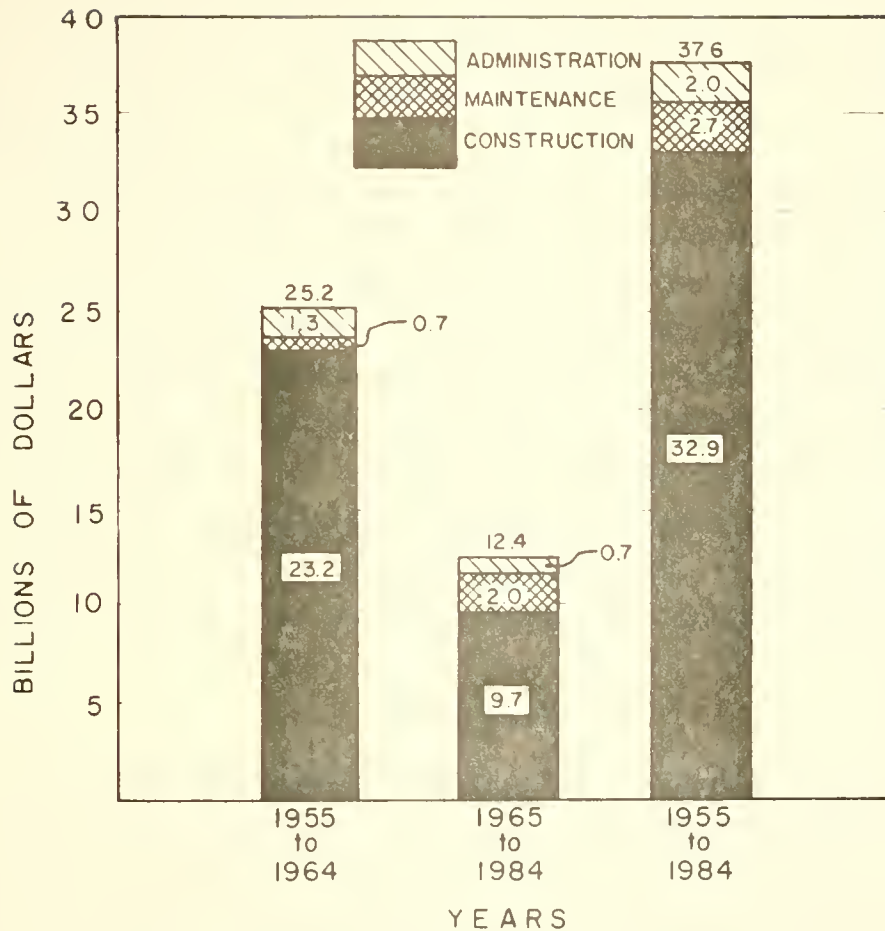


FIGURE II. RATE OF EXPENDITURE BASED ON INTERSTATE CONSTRUCTION, MAINTENANCE AND ADMINISTRATIVE NEEDS FROM 1954 TO 1984³⁶

highway needs after 1964 was not as pressing a problem. Since the Interstate was to be completed in the initial ten-year period (1955-64) for 1974 traffic, expenditure needs of the System would drop sharply after 1964. The cost of construction, maintenance and administration would continue to be substantial and would steadily increase; however, overall expenditures would be lower than for the initial ten-year stage.

Having determined the needs, the study next had to make decisions on the proportion of the improvement cost born by each governmental jurisdiction and the means of financing the improvement (general taxation, highway user taxations, general obligations bonds or toll revenue bonds). However, these decisions were left to the President's Advisory Committee on a National Highway Program. Their report A 10-Year National Highway Program appears later in this chapter. The financial findings of the Advisory Committee were merely adopted from this needs study.

Conclusion

This needs study documented the increasing inadequacy of the Nation's highway network and determined that the Interstate System was the most critically deficient system in the network. The study further described the probable causes of the highway problem and barriers to its resolution. The importance of an adequate highway network to the National economy was stressed, and the relationships between highway expenditures and the National economy were described. Finally, the study estimated the cost of bringing the Nation's highway network to a level of adequacy in ten years and the cost of maintaining the level of adequacy for the next twenty years.

The needs study estimated that \$23.2 billion was needed over the initial ten-year period (1955-64) to upgrade the Interstate System for the predicted traffic of 1974. Again, the estimate was restricted essentially to that portion of the System which had been designated in 1947 and did not include the cost of 2,300 miles of urban feeder routes for extension of the System to the 40,000-mile statutory limit. The cost estimate was generally based on 1954 construction prices without an adjustment for escalation.

Nevertheless, the new cost estimate for improvement of the Interstate System was double that of the 1949 needs study. This time the estimate was based on the cost of upgrading the Interstate in ten years (1955-64) to a level of adequacy for the predicted traffic of 1974 (almost twenty years hence) rather than the cost of eliminating the present deficiencies of the system over a twenty-year period. The 1954 needs study adopted limited-access control standards as the basis of the needs estimate rather than tolerable standards which was the case in 1949. There was now a recognition of need for extensive relocation of the System rather than the mere upgrading of existing highways. These factors account for much of the difference from the 1949 cost estimate.

The report further acknowledged that the estimate tended to reflect financial feasibility rather than anticipated needs, and that the States with less experience in constructing limited-access highways tended to underestimate their needs. This inexperience was to result in substantially higher cost estimates for completing the Interstate in the future.

The National Highway Program Study

The concept of a drastically improved highway system was formally presented on behalf of President Eisenhower by Vice President Nixon at the Governors' Conference on July

12, 1954. The Nation's highway network was inadequate and obsolete. Consequently, the President specifically called for "a grand plan for a properly articulated (highway) system that solves the problems of speedy, safe transcontinental travel - intercity transportation - access highways - and farm to farm movement - metropolitan area congestion - bottlenecks - and parking."³⁷ The President suggested \$5 billion annually for the next ten years in addition to current highway expenditures. This added expenditure would pay off in economic growth.

The highway improvement program was designed to achieve better or more adequate highways and not more highways. The representatives of the railroads pointed out the competitive threat of improved highways and increased truck haulage; they would eventually be placated by the financial arrangements for highway construction.

The Federal government had at present matched State funds in expenditures on the Federal Aid Primary, Secondary, and Urban Extensions. From the viewpoint of National interest, some sections of the Primary System were considered more important than others; thus, in 1944 Congress authorized the selection of a special network, the National System of Interstate Highways, to connect principle metropolitan areas, major cities and industrial centers, to serve the national defense, and to connect continental routes in Canada and Mexico. In 1954, the System comprised 1.2 percent of the total road mileage and joined forty-two State capitals and ninety percent of all cities over 50,000 in population. The System carried one-seventh of all traffic and one-fifth of all rural traffic, served sixty-five percent of the urban and forty-five percent of the rural populations, and was the key system from the standpoint of Federal interest in productivity and National security. A total of 37,700 miles of the 40,000-mile System had been designated by 1954.

Following up his message to the governors, President Eisenhower appointed an Advisory Committee on a National Highway Program headed by General Lucius D. Clay. The Committee reviewed past investigations of the Nation's highway program (including those on the Interstate System) and conducted extensive investigations of their own. Their report, A 10-Year National Highway Program, was transmitted to Congress in February of 1955.

This program recommended that Congress authorize long term highway financing, whereby the existing level of Federal aid would be continued and additional funds would be concentrated for ten years on modernizing the 40,000-mile National System of Interstate Highways. The program was to be self-liquidating since the funds to be utilized in construction would be equivalent to the revenues anticipated from Federal taxes on gasoline and lubricating oils.

Program Recommendations

A safe and efficient highway network was essential to America's military and civil defense and to the American economy. The existing Interstate System was found to be inadequate for both current and future needs and would have to be improved to meet the requirements of a growing population and an expanding economy.

Over the next ten years, \$101 billion was needed to upgrade all highway systems, including the 37,700 designated miles of Interstate System to meet future needs. The cost of modernizing the presently designated Interstate System and urban connecting arterials amounted to \$27 billion alone.

The President's Advisory Committee on the National Highway Program recommended that the Federal government's share of all highway construction be increased to thirty percent and that the Federal government assume prime responsibility in financing the modernization of the Interstate system. The federal share of the total highway

construction cost amounted to \$31.225 billion for the ten-year period. The Federal Interstate responsibility would average \$2.5 billion annually for a ten-year period, and the State and local governments would provide the remaining \$2 billion. The traditional Federal aid to States was to be continued at the same level as authorized by Congress in 1954 - \$525 million annually for the Federal Aid Primary and Secondary Systems, \$75 million for Federal Aid Urban Extensions excluding those in the Interstate System, and \$22.5 million for forest highways. The Interstate System was to be omitted from this traditional authorization, and an additional authorization was to be made specifically for the Interstate System.

The Federal share of the Interstate System construction cost, which amounted to \$25 billion, or approximately ninety percent of the total Interstate cost, was to be financed by \$20 billion of bonds to be issued by a Federal Highway Corporation created by Congress. The total finance cost was expected to approximate the two-cent Federal gasoline and lubricating oil tax over a 32-year period, and it was anticipated that the revenue bonds would be repaid over the 32-year period by these revenues.

The Federal Highway Corporation was to have a Board of Directors composed of three citizens, appointed by the President and confirmed by the Senate, with the Secretary of the Treasury and the Secretary of Commerce as ex officio members. The Secretary of Defense was to be an ex officio member of the Board in all matters relating to highway location. The primary responsibility of the Board of Directors was that of determining financial policy and that of serving as an appeals board to resolve differences between Federal and State authorities.

Toll roads were to be included in the Interstate System if they were built to acceptable Interstate standards. However, toll financing was not deemed the solution to the

problem of network modernization. A toll road feasibility study requested of the Bureau of Public Roads by Congress in 1954 substantiated this belief. This study, Progress and Feasibility of Toll Roads and Their Relation to the Federal-Aid Program, indicated that only 6,700 miles of the Interstate System could be feasibly financed through tolls.

The Advisory Committee also suggested that credit be extended to States for sections of the Interstate already completed, provided the funds were utilized for further highway improvement.

Finally, the States would have to modernize highway enabling laws, particularly in connection with land acquisition, the control of access, and cooperation between State, city and county in highway management. It was suggested that Congress provide for the use of eminent domain to acquire right-of-way for the Interstate System if acquisition of full-access control right-of-way proved infeasible through the normal exercise of State law.

Most of these recommendations were to become law in the future, but many were to be revised drastically.

Inadequacy of the Present Highway Network

The Committee's report documented the inadequacy of the 1954 highway network; this had been described in greater detail in the 1955-84 needs study. Briefly, highway construction had failed to keep pace with the ever increasing traffic demand. Eventually, the lack of an adequate transportation system would have serious economic repercussions. The Advisory Committee felt that the cost of an accelerated program to modernize the system could be justified by increased highway user benefits alone.

Many highways had become obsolete because of the failure to control access. Thus, an Interstate System with full-access control and complete grade separation was considered

essential. It was recognized that service or frontage roads would be required for local traffic, raising the ultimate cost of the Interstate System. In urban and suburban areas, the Advisory Committee reaffirmed the belief that it would probably be more economical to relocate the Interstate routes than to acquire the additional land necessary to permit full-access control.

Cost of Modernization

In section 13 of the 1954 Federal-Aid Highway Act, the Congress directed the Secretary of Commerce to make a comprehensive study of all phases of highway financing, including a study of the cost of completing the several systems of highways. Estimates for the modernization of the Nation's roads over the next ten years were prepared by the Bureau of Public Roads in cooperation with the highway departments of each State. The report, Needs of the Highway Systems, 1955-1984, was presented to Congress in the Spring of 1955. As the report was described in detail in the last sub-chapter, only the major points that relate to the "national highway program" are discussed herein. The cost figures of the needs study were adopted by the President's Advisory Committee for the National Highway Program.

Estimates were prepared on the cost of upgrading each system in ten years to a level adequate for the traffic volumes predicted in 1964 except for the Interstate System where the predicted traffic in 1974 was to be used. Assuming the level of adequacy was reached in 1964, estimates were then made to sustain the level of adequacy for the next twenty years, 1965 to 1984. Existing and programmed toll roads were also included in the estimate, and 1954 construction prices were used as a basis for the estimated costs.

From the cost estimates, it was determined that \$101 billion would be needed to modernize the Nation's roads

over a ten-year period. The Interstate System would account for \$23 billion of the Nation's needs. However, this figure did not take into account expansion of the System to the legislative limit of 40,000 miles. Most of these Interstate extensions were urban, however, and (to a certain extent) were estimated in the costs of other systems.

For the Interstate System to be fully effective, it had to be tied to existing arterials in congested urban areas. Studies showed that these urban feeder routes would add approximately another \$4 billion to the total Interstate System construction cost. Transferring \$4 billion from the needs of the other systems for the 2300 miles of urban Interstate extensions, the Interstate System and its urban feeders could be constructed at an overall estimated cost of \$27 billion over a ten-year period, assuming no increasing trend other than traffic growth.

The Interstate System was given construction priority because of its importance to the National economy and defense. To preserve the purpose for which it was intended, a primary feature of the Interstate System was the provision for adequate right-of-way to permit full-access control. Grade separation structures were required for all intersecting routes, not closed at the Interstate right-of-way line, and for all intersected routes that were to have access to the Interstate. These latter steps would further preserve the capacity of the System and insure maximum safety.

Under the standards developed for the "national highway program", 7,000 miles of the Interstate System would remain two-lane highways when completed to 1974 standards. After 1974, additional lanes could be added to the Interstate System to preserve its level of adequacy. [Refer to Figure 12, p. 83].

In constructing a fully controlled access system, the Advisory Committee also stressed the importance of promoting

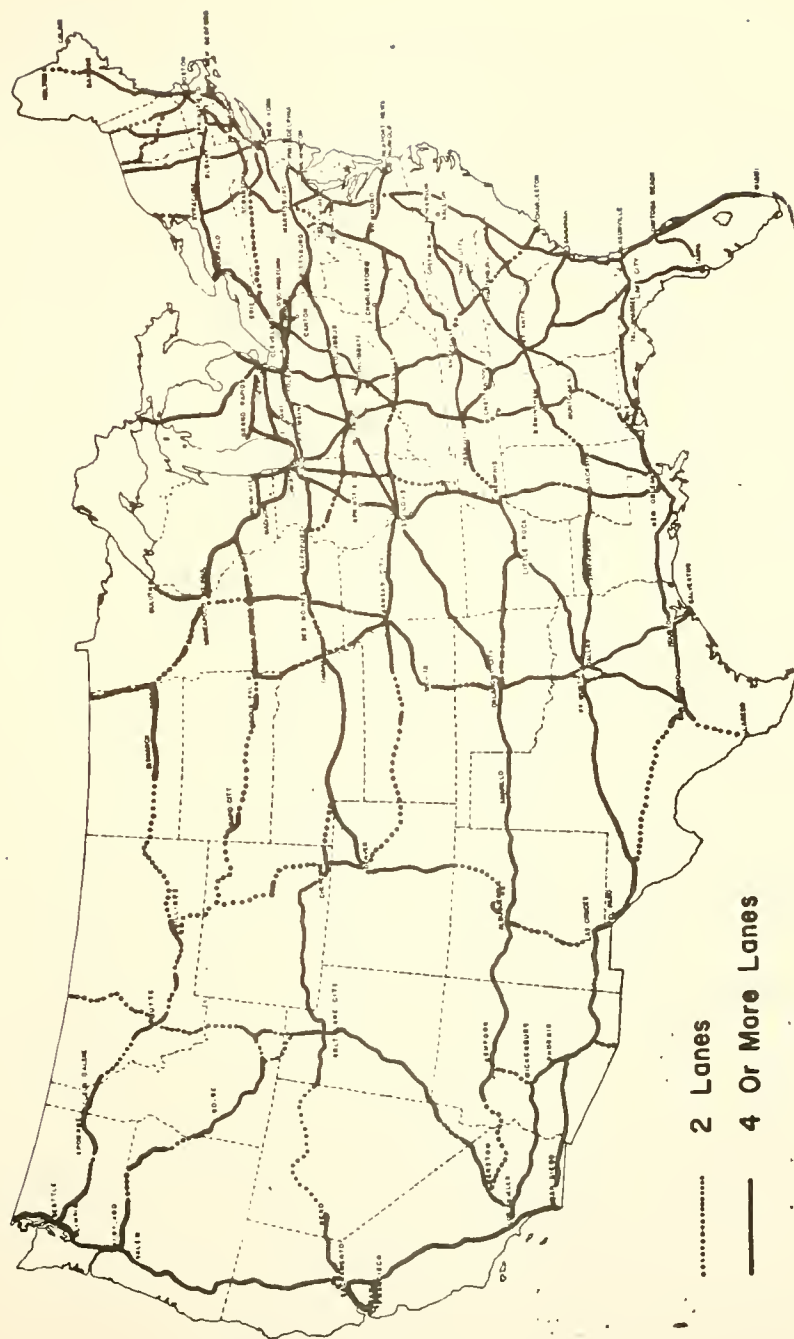


FIGURE 12. NATIONAL SYSTEM OF INTERSTATE HIGHWAYS: RURAL STATUS OF
IMPROVEMENT BY 1965³⁸

free enterprise and preventing monopolistic tendencies in providing highway user services such as food, fuel and lodging.

Financing the National Highway Program

If allowance was made for the anticipated growth in vehicle registration and usage, if the present highway user tax structure was continued, and if the current rates of expenditure for maintenance were continued, only \$47 billion in Federal, State and local revenues would become available for highway construction over the next ten years. Because the ten-year needs for all systems amounted to \$101 billion, a \$54 billion deficit would have to be overcome. Decisions had to be made as to the proportion of the total cost to be born by each governmental jurisdiction and the means of financing such cost.

The Executive Committee of the Governors' Conference recommended that the Federal government assume primary responsibility, with some State participation, for financing construction on the Interstate System and its urban feeder routes, and that the Federal government continue to allocate Federal user taxes to the States for highway construction on other Federal aid systems without change. The President's Advisory Committee on a National Highway Program reiterated these recommendations and suggested that the Federal government bear thirty percent of the total cost and approximately ninety percent of the Interstate cost. The proposed 10-year national highway program financing appears in Table 7, p. 85 .

The Federal share of the total highway needs over the next ten years was approximately \$31 billion. In the past, the States had been required to contribute to obtain funds from the \$175 million made available annually for the Interstate by the Federal Government. Since the States were not expected to increase their contribution, the Federal government

TABLE 7. PROPOSED 10-YEAR NATIONAL HIGHWAY PROGRAM FINANCING ³⁹

(IN BILLIONS OF DOLLARS)

System	Estimated 10-year needs		Proposed Federal Highway Corporation	financial responsibility		
	Rural	Urban		Regular Federal Aid	State and Local Governments	Total
Interstate :						
Existing	12	11	22		1	23
Extended		(a) 4	3		1	4
Federal Aid Primary	20	10		3.150	(b) 25.875	29.025
Federal Aid Secondary	15			2.100	12.900	15.000
Federal Aid Urban	(c)	(c)		0.750	(d)	0.750
Forest Highway	(c)	(c)		0.225		0.225
Subtotal, Federal Systems	47	25	25	6.225	40.775	72.000
Other Rural Roads	17				17	17
Other Urban Streets		12			12	12
Total, All Systems	64	37	25	6.225	69.775	101

(a) 4 billion transfer from other urban street needs

(b) Reduced by 0.75 billion for Federal aid urban and 0.225 for Forest highways

(c) Included above

(d) Included in Federal Aid Primary

would have to provide approximately \$25 billion of the total \$27 billion Interstate construction cost.

The States would provide the remaining \$2 billion for the Interstate. Matching requirements on the other Federal Aid Systems would result in a little less than \$6.225 billion in State and local funds. This meant the State and local governments would have to provide an additional \$32.55 billion above their matching funds to meet the ten-year total cost of Federal Aid Systems other than the Interstate. Adding the \$29 billion ten-year cost for other State and local road; the total State and local share of the national highway program came to nearly \$70 billion over the ten-year period.

Having determined the proposed expenditures for the various systems and the financial responsibility for these systems, the President's Advisory Committee on a National Highway Program had to determine the source of funding for the program and particularly the means of overcoming the \$54 billion deficit. Possible means of financing the program included general taxation, highway user taxation, or deficit financing through general obligation or toll revenue bonds.

As of December of 1954, 5,242 miles of feasible toll roads which paralleled or coincided with the Interstate System in twenty-three States were in operation, under construction, financed or authorized. Proposals in these and five more States would bring the mileage, coinciding with the Interstate, to 8,527 miles, excluding unfeasible mileage. Indiana had the 157-mile East-West Turnpike under construction, the 150-mile Hammond-Indianapolis toll road under authorization, the 110 mile Indianapolis-Kentucky Line toll road (which proved unfeasible), and 110 mile Indianapolis-Cincinnati toll road under proposal.

Although toll financing on a sound basis could meet the needs of a limited portion of the Interstate System, it could not support the needs of the total System because many portions of the System could not be feasibly financed through

tolls. The Advisory Committee felt that "the Federal government should not enter into toll road construction nor provide funds for the deficit financing of otherwise non-self supporting projects."⁴⁰ Major Interstate structures such as bridges and tunnels might be toll financed when economically feasible; but this determination was left to the State and the proposed Federal Highway Corporation.

In the past, approximately half of the States had planned to meet their Interstate needs by constructing toll-free expressways to design standards equaling or exceeding toll financed facilities. These free facilities were to be financed from current revenues or bond issues of the State, amortized through gasoline taxes and license fees. However, neither State nor toll financing would be adequate to modernize the entire Interstate System in ten years.

As the Committee did not want to discourage States from constructing sections of the Interstate with State or toll financing, the Committee suggested that States receive credit for sections of the Interstate already completed if these sections met completed Interstate System standards and if the reimbursed funds were used to improve other Federal aid systems. No Federal funds were to be used for toll roads unless returns from tolls above financing would go for the construction of other Federal aid highways.

To limit the Federal liability for past construction with State or toll financing, credit for roads built from 1947 to 1951 was limited to those sections which coincided with the Interstate and met the new Interstate standards and then only to a maximum of forty percent of the construction cost excluding financing. Credit for roads built from 1952 to 1955 was limited to a maximum of seventy percent for sections that coincided with the Interstate and met the new Interstate standards. However, no Federal fund credit

would be allowed in excess of the remaining amortization. Roads built after 1955 would be credited at their total cost.

To make up the deficiency in revenues for the Federal share of total national highway program cost, which in effect amounted to the Federal cost of the Interstate, the Advisory Committee proposed the creation of a Federal Highway Corporation to finance the Interstate construction. The proposed Federal Highway Corporation was to be empowered by Congress to issue bonds and to utilize the proceeds for the following purposes: (1) to pay the States the Federal share of the Interstate construction cost; (2) to appropriate credit to the States for sections of the Interstate already built; (3) to cover the cost of administration, research, and planning in the Corporation; (4) to establish a revolving fund for the States enabling them to pursue the program, pending receipt of the payments above; and (5) to possibly make loans to those States which lacked Interstate matching funds.⁴¹

The Corporation would be authorized to issue \$20 billion of taxable bonds, at three percent interest, to meet its share of the cost of completing the Interstate in ten years. The allocations for the Interstate program were expected to approximate the receipts from the two-cent Federal tax on gasoline and lubricating oil in excess of the annual \$622.5 million covering the Federal cost of the other Federal aid systems. Temporary borrowing was also possible from the Treasury if receipts fell temporarily behind the appropriations to the States. From Table 8 (p. 89) financing the cost of the Interstate program by bond issues over a thirty-one year period from 1956 to 1987 would amount to \$11.548 billion in interest. Unfortunately, the committee report covered only the Federal share of the \$54 billion deficit for the total ten-year highway needs and offered no guidance as to how

TABLE 8.

FINANCIAL PLAN FOR HIGHWAY PROGRAM⁴²

(EXCESS FEDERAL GASOLINE TAX OVER \$622.5 MILLION ANNUALLY AVAILABLE FOR HIGHWAY PROGRAM)

(IN MILLIONS OF DOLLARS)

Year	Estimated Federal 2-cent user tax less \$622.5 million	Construction Expenditures			Bond Maturities, Years	Annual Debt Service			Annual Excess Revenues	Balance
		Total	From Revenues	From Bond Proceeds		Interest 3 %	Principal	Total		
1956	527	1000	500	500	11	—	—	—	27	27
1957	567	2000	500	1500	13	15	—	15	52	79
1958	611	2500	600	1900	15	60	—	60	-49	30
1959	652	2700	500	2200	17	117	—	117	35	65
1960	694	2900	500	2400	19	183	—	183	11	76
1961	734	2900	500	2400	20	255	—	255	-21	55
1962	777	2900	500	2400	21	327	—	327	-50	5
1963	818	2900	400	2500	21	399	—	399	19	24
1964	860	2700	400	2300	22	474	—	474	-14	10
1965	898	2500	365	2135	22	543	—	543	-10	None
1966	943	—	—	—	—	607	—	607	336	336
1967	983	—	—	—	—	607	500	1107	-124	212
1968	1024	—	—	—	—	592	—	592	432	644
1969	1063	—	—	—	—	592	—	592	471	1115
1970	1099	—	—	—	—	592	1500	2092	-993	122
1971	1141	—	—	—	—	547	—	547	594	716
1972	1171	—	—	—	—	547	—	547	624	1340
1973	1218	—	—	—	—	547	1900	2447	-1229	111
1974	1257	—	—	—	—	490	—	490	767	878
1975	1294	—	—	—	—	490	—	490	804	1682
1976	1339	—	—	—	—	490	2200	2690	-1351	331
1977	1381	—	—	—	—	424	—	424	957	1288
1978	1422	—	—	—	—	424	—	424	998	2286
1979	1465	—	—	—	—	424	2400	2824	-1359	927
1980	1504	—	—	—	—	352	—	352	1152	2079
1981	1550	—	—	—	—	352	—	352	-1202	877
1982	1588	—	—	—	—	280	2400	2680	1308	2185
1983	1631	—	—	—	—	280	2400	2680	-1049	1136
1984	1671	—	—	—	—	208	2500	2708	-1037	99
1985	1706	—	—	—	—	133	—	133	1573	1672
1986	1745	—	—	—	—	133	2300	2433	-683	984
1987	1785	—	—	—	—	64	2135	2199	-414	570
Total	37,118	25,000	4765	20,235	—	11,548	20,235	31,783	—	—

the States would overcome their share of the deficit.

The question of financing was by no means settled by the President's Advisory Committee on a National Highway Program and was a constant subject of debate until passage of the Federal Aid Highway Act of 1956.

Implementation of the National Highway Program

The Federal Highway Corporation was to be responsible for the administration of the program. While the Federal Highway Corporation Board of Directors was principally concerned with financial management, it was to serve as a board of appeals for disputes between the States and Bureau of Public Roads.

A shortage of engineers and technical personnel might have caused Interstate program implementation problems; however, the use of private engineering organizations, simplified procedures and standardized specifications for the long-range program were expected to reduce engineering requirements.

Surveys were made by the American Road Builder's Association and the Associated General Contractors of America concerning the adequacy of materials and contractors to carry out the Interstate program. These organizations assured the Advisory Committee that the program was feasible because the length of the program allowed latitude for training needed personnel. The American Association of State Highway Officials substantiated this contention.

Revision of enabling legislation, governing the financing and construction of State highways, would be needed for efficient execution of the national highway program. Areas needing extensive revision included advance acquisition of right-of-way, control of access, and the cooperative working agreements between State and local agencies. The Committee suggested that the Federal government could be

enabled to exercise its right of eminent domain to acquire Interstate right-of-way when a State was unable to do so.

Report Conclusion

At the present level of expenditure, \$47 billion would be spent on highway improvement over a ten-year period beginning in 1956. Because the total needs of the highway systems were \$101 billion, a \$54 billion deficit would exist. The Federal government would assume approximately half of this deficit by financing its share of the Interstate through bonds. However, the Committee offered no suggestions as to how the State and local governments were to overcome their share of the deficit.

While the national highway program proposal had many attractive aspects, there were several features that weighed against its adoption. The plan placed a thirty-two year ceiling on the regular Federal aid highway programs, excluding the Interstate. Deficit financing of the Interstate program would cost \$12 billion in bond interest. The creation of the Federal Highway Corporation would, in effect, remove fiscal control of the program from Congress.

In support of the proposed scheme of deficit financing for the Interstate, the President's Advisory Committee on a National Highway Program had the following comment: "It (committee) also is sympathetic to "pay-as-you-go" financing. However, in this instance, the advantages of a modern, efficient national highway network to be completed in 10 years to meet the traffic demands to be reached a decade later, and with a minimum life of 30 years justifies its financing through a bond issue to be retired during the useful life of the system."⁴³ The increase in Federal expenditures of \$25 billion for Interstate highways was considered vital to national growth.

Notes

1. Laws Relating to Federal Aid in Construction of Roads (Washington, D. C.: U.S. Government Printing Office, 1971), p. 193.
2. Toll Roads and Free Roads, House Doc. #272, 76th Congress, 1st Session (Washington, D. C.: U.S. Government Printing Office; April, 1939), p. 1.
3. Toll Roads and Free Roads, p. 70.
4. Toll Roads and Free Roads, p. 19.
5. Toll Roads and Free Roads, p. 109.
6. Toll Roads and Free Roads, p. ix.
7. U.S. National Interregional Highway Committee, Interregional Highways (Washington, D. C.: U.S. Government Printing Office; January, 1944), p. 140.
8. H. E. Hilts, "Planning the Interregional Highway System", Public Roads, Vol. 22, No. 4 (Washington, D. C.: U.S. Government Printing Office; June, 1944), p. 73.
9. Hilts, p. 94.
10. Interregional Highways, p. 2-3.
11. Interregional Highways, p. 4.
12. Interregional Highways, p. 8.
13. Interregional Highways, p. 7.
14. Interregional Highways, p. 40.
15. Interregional Highways, p. 49.
16. Interregional Highways, p. 49.
17. Interregional Highways, p. 49.
18. Interregional Highways, p. 50.
19. Interregional Highways, p. 78.
20. Interregional Highways, p. 91.
21. Interregional Highways, p. 106.

22. Interregional Highways, p. 115.
23. Interregional Highways, p. 122.
24. Highway Needs of the National Defense, House Doc. #249, 81st. Congress, 1st Session (Washington, D. C.: U.S. Government Printing Office; June, 1949), p. vi.
25. Highway Needs of the National Defense, p. 10.
26. Highway Needs of the National Defense, p. 10.
27. AASHO
28. Needs of the Highway System, 1955-84, House Doc. #120, 84th Congress, 1st Session (Washington, D. C.: U.S. Government Printing Office; 1955), p. 2.
29. Needs of the Highway System, 1955-84, p. 3.
30. Needs of the Highway System, 1955-84, p. 8.
31. Needs of the Highway System, 1955-84, p. 8
32. Needs of the Highway System, 1955-84, p. 14.
33. Needs of the Highway System, 1955-84, p. 15.
34. Needs of the Highway System, 1955-84, p. 18.
35. Needs of the Highway System, 1955-84, p. 16.
36. Needs of the Highway System, 1955-84, p. 17.
37. President's Advisory Committee on a National Highway Program, A 10-Year National Highway Program (Washington D. C.: U.S. Government Printing Office; January, 1955), p. 1.
38. A 10-Year National Highway Program, p. 20.
39. A 10-Year National Highway Program, p. 18.
40. A 10-Year National Highway Program, p. 14.
41. A 10-Year National Highway Program, p. 20.
42. A 10-Year National Highway Program, p. 28.
43. A 10-Year National Highway Program, p. 30.

CHAPTER IV

THE PROGRAM AND ITS EVOLUTION

In the 1930's, there was a growing awareness of the inadequacy of the existing intercity highways, and a system of expressways spanning the nation was conceived as a possible solution. Goals and objectives for the interstate system were defined by various studies and legislation. To accomplish the goals, many studies attempted to determine the deficiencies of the highway network and to formulate a program to correct the deficiencies and, thereby, realize the goals of the interstate system. Over time, the studies documented the ever increasing deficiencies of the Nation's highway network, particularly the existing highways coinciding with the interstate system.

In 1944, Congress authorized the designation of 40,000 miles of Interstate highways, but appropriated no money specifically for the System. As improvement of the Interstate and other systems was delayed, highway needs continued to grow; and the cost of improvement began to correspondingly increase. The later studies concluded that many of the existing highways coinciding with the Interstate would have to be relocated, that present revenues and expenditures were inadequate to meet the total highway needs, and that some means of overcoming the financial problem must be found.

The Federal Aid Highway Act of 1952 was the first legislative action to provide funding for the Interstate System. The 1954 Federal Aid Highway Act increased the Interstate authorizations, but Interstate funding still fell far short of actual needs. Finally, Congress responded by authorizing a

comprehensive Interstate System program in the Federal Aid Highway Act of 1956 and by creating a highway fund in the companion Highway Revenue Act of 1956 to provide adequate revenues for the Interstate Program as well as other system programs. These two acts established the authorizations and revenues necessary to complete the Interstate System within a fixed time period, and set forth the essential elements of the current Interstate Program.

This chapter reviews the Program and its evolution.

Construction Time

The Interregional Highway study of 1944 had suggested that the Interstate System be upgraded over a period of twenty years. This was a rate of improvement based on the replacement of the Interstate sections as they became obsolete. Because the Interstate System carried the greatest number of vehicle miles in relation to its length and was the most deficient system in the highway network, its improvement was considered essential to the economy and national defense by the 1955 national highway program study. Thus, the President's Advisory Committee on a National Highway Program recommended improvement of the Interstate System to a level of adequacy in ten years (1955-1964) for the predicted traffic volumes of 1974. In the Federal Aid Highway Act of 1956, Congress expanded the Interstate Program to thirteen years to permit the proposed financing to match the authorizations.¹ The longer period would also give the States time for advance preparation and planning in implementing the Interstate Program. Congress had felt that it would take the States a couple of years to gear up and get the Program in full swing.

After the Interstate Program had been underway for a few years, it was soon realized that proposed financing would not match the authorization rate. To compound the

problem, the cost of the Interstate Program was continually on the increase due to a combination of factors: higher design standards, increases in original mileage, the emphasis on the environment, relocation compensation and services, inflation and a variety of other changes in standards and regulations. Consequently, financing was to continually fall behind the authorizations needed to complete the Program in the time allotted. Congress responded by stretching out the Program so that revenues would more nearly match the Interstate costs.

The Federal Aid Highway Act of 1964 expanded the Program from thirteen to fifteen years and the completion date from June 30, 1969 to June 30, 1971. In 1966 the completion date was moved to June 30, 1972. Congress expanded the Program to eighteen years by means of the 1968 Federal Aid Highway Act. On December 31 of 1970, the completion date was moved to June 30, 1976 which was still in effect at the time this report was compiled. As the Interstate System neared completion in 1972, construction priority was shifted from the Interstate System to the other Federal aid systems. This resulted in proposals before Congress to move the completion date to 1984 or later.

As the Federal government has the primary responsibility of funding the Interstate Program and Congress has called for simultaneous completion of the entire System, Indiana could only utilize the funds made available and could not complete its portion of the System earlier. Some States were able to utilize deficit financing for Interstate construction; this allowed more rapid construction with State funds early in the Program. Indiana's present constitution prevents deficit financing, and Indiana had to build on a "pay as you go" basis. Nevertheless, over time Indiana has completed as much, if not more of its System, than the States which utilized deficit financing. As Congress

adopted a "pay as you go" policy, States were appropriated funds on the basis of the cost to complete the System in the State; thus, States which used deficit financing had little advantage in completing their portion of the System sooner.

Manpower

There was concern that there would not be enough labor for the construction of a project of such magnitude. However, the contractors and labor unions assured the President's Advisory Committee on a National Highway Program in 1955 that the length of the Interstate Program would allow sufficient time to train construction laborers if a deficiency should appear early in the Program.

It might be noted that the Interstate Program was intended to utilize the labor released from war time production in 1945. Because the Federal government has sought to maintain a stable economy through the regulation of Federal expenditures, spending on the Interstate Program emerged as one means for such stabilization. Increased Federal expenditure on the Program would stimulate the construction industry and also draw unemployed labor into it. Throughout the Interstate Program, Federal expenditures were regulated in an attempt to stabilize the economy.

Because of the magnitude of the Program, there was a shortage of qualified engineers initially to plan and design the new routes. Again the length of the Program would hopefully ameliorate the engineer deficiency. It was also hoped that standardized designs for the Interstate would reduce the amount of engineering work. Obviously, the State highway departments would have to expand their personnel or rely more heavily on private consulting firms.

Material and Equipment

The National Highway Program study revealed that there were sufficient material resources and construction equipment in most areas. Furthermore, the Federal government encouraged the participation of small businesses in the Interstate Program to assure sufficient resources. However, bids were still required to be on a competitive basis.

Financing in General

Federal Highway Trust Fund

The Highway Revenue Act of 1956 created the mechanism to insure implementation of the Interstate Program as well as continue the National Highway Program. This mechanism was the Federal Highway Trust Fund which created a link between Federal highway user taxes and Federal aid for highways.

The Trust Fund was to achieve several objectives. It provided funding on a continual basis for a long-range Federal aid program. This would enable States to set up their own long-range programs and allow them to establish construction priorities. In the past, highway programs were short in nature since the source of future funding was always in doubt. Continuous funding would make the long-range program less subject to the whims of the politicians.

The Trust Fund would provide funding to complete the Interstate Program as well as funds for the other Federal aid systems. The Trust Fund also served as a mechanism to limit competition with other transportation modes. Since highway user taxes were earmarked for highway construction, those who benefited from the highways paid for the benefits so that highway financing was not an outright subsidization of a particular mode of transportation. This factor placated the railroad lobby and assured the funding of the Interstate

Program. The 1956 Revenue Act also confined the National Highway Program to a pay-as-you-go basis.

The Federal Highway Trust Fund was created by the transfer of a variety of highway user taxes from the General Fund and some new taxes. These included motor fuel taxes, excise taxes on new commercial vehicles, taxes on rubber and taxes on the use of certain vehicles. The tax rates, the percentage of a particular tax assigned to the Trust Fund, and the particular taxes assigned to the Trust Fund were varied throughout the Interstate Program.

Initially, the tax on motor fuel was increased from two to three cents per gallon except for non-highway vehicles and uses not requiring vehicle registration and was entirely earmarked for the Trust Fund with minor exceptions. The excise tax on new commercial vehicles was increased from eight to ten percent with half going to the Trust Fund. The tax on highway vehicle tires was increased from five to eight cents per pound; taxes on other tires and inner tubes remained at five and nine cents per pound, respectively; and a new tax of three cents per pound was levied on tread rubber. All the rubber taxes went into the Trust Fund. Congress also levied a new tax at \$1.50 per year per 1000 pounds on highway vehicles in excess of 26,000 pounds; this tax went entirely to the Trust Fund. The Trust Fund was to terminate on July 1, 1972 and the taxes were to revert to their original rate. However, the life of the Trust Fund has since been extended.

In the operation of the Federal Highway Trust Fund, Congress made the following policy declaration in the Highway Revenue Act of 1956:

"That the total receipts of the trust fund will be less than the total expenditures from such Fund or that the distribution of the tax burden among the various classes of persons using the Federal-aid highways, or otherwise deriving benefits from such highways is not equitable, the Congress shall enact

legislation in order to bring about a balance of total receipts and expenditures, or such equitable distribution, as the case may be."2

It was recognized that expenditures would exceed revenues in the earlier years of the Trust Fund, but the deficit would be overcome by excess revenues in the later years. To cover the temporary deficits in the early years, a provision was added to the 1956 Revenue Act to permit borrowing with interest from the U. S. Treasury. However, this provision was nullified by the Byrd Amendment which required a strict pay-as-you-go financing. If a deficit in the Trust Fund was anticipated, Interstate apportionments to the States would be reduced to prevent a deficit in the Highway Trust Fund according to the Byrd Amendment. Thus, the borrowing provision was inoperative except for less than a year. Although the Trust Fund established a continuous source of funds for highway construction, Congress had to make continuous adjustments in the apportionments to keep the expenditures and revenues in balance. Thus, Congress retained control of the Interstate Program and other Federal aid programs. Congress also requested the Bureau of Public Roads to make a highway cost allocation study. The purpose of the study was the determination of an equitable distribution of the highway user tax burden on the various classes of vehicles utilizing the highways.

Highway Acts

The Federal Aid Highway Act of 1956 was a landmark in the national highway program. It authorized the completion of an entire highway system - the Interstate System. Although the basic Federal - State relationship was unaffected, it departed from the traditional 50-50 Federal - State sharing of costs and traditional apportionment formula. The Act also added the word Defense to the National System of Interstate Highways name - National System of Interstate and Defense

Highways. The act most notably accelerated the highway improvement program and brought about a new era in highway transportation.

Apportionment of Funds. The traditional fixed factor empirical formula for the apportionment of Primary and Secondary Federal Aid System funds was based one-third on population, one-third on area, and one-third on the mileage of rural delivery routes and star routes of each State in relation to that of all the States with no State receiving less than half a percent of the monies for each system. The appropriation formula for the Urban Federal Aid System was based on the ratio of population in urban places of 5000 or more in each State to that of all the states. Prior to the Federal Aid Highway Act of 1954, apportionments for the Interstate System had been on the same basis as the Primary and Secondary Systems. In 1954, the traditional formula was considered inadequate to meet the construction needs of the Interstate System, particularly in urban areas. Because population and congestion were directly related, Congress altered the traditional formula for the Interstate System to give greater weight to population. The 1954 Interstate appropriation formula was based half on population and half on the traditional formula. This in effect resulted in an apportionment formula based two-thirds on population, one-sixth on land, and one-sixth on the mileage of rural delivery routes and star routes.

In developing the 1956 Act, the congressional faction led by Senator Gore maintained that the 1954 Interstate empirical apportionment formula should be the basic formula for the continued allocation of Interstate funds to the States. They felt that an apportionment based on needs, as set forth in the study Needs of the Highway Systems, 1955-84, would penalize those States that had done a poor job of estimating costs. The Senate report on the bill stated as follows:

"The figures contained in this table (the 1955-84 Needs Study) were compiled by the Bureau of Public Roads from estimates submitted by the various States as to the expected cost of correcting critical deficiencies in their highway systems. No standard criteria were used by the several States in submitting their estimates. Obviously many of the estimates are low. Few of them were based upon objective surveys of probable actual cost. An analysis of these estimates, when related to interstate mileage and terrain within the States, indicates that they are in large measure unrealistic. The Committee (Public Works Committee of the Senate) believes it would be wholly unsound to initiate so important a program with apportionment of funds calculated on so inequitable a basis."³

The Senate faction further felt that no State would be able to plan its program intelligently without knowledge of the amount of funds that would become available in the future. If the allocation formula was based on the cost to complete the System, as estimated by the States, Congress would lose control over the apportionment of the Interstate program funds.

The opposing faction in the House, led by Representative Fallon, felt the traditional formula would never meet the objective of completing the designated System simultaneously throughout the States within the prescribed time. They recommended an apportionment based on the ratio of each States' estimate to complete the System to that of all the States. The traditional formula was empirical in nature and inherently failed to reflect the actual needs for improvement. The House bill apportioned the Interstate funds authorized for fiscal years 1957 and 1958 on the basis of the estimate of cost to complete the Interstate System as stated in the Needs of the Highway Systems, 1955-84. For fiscal 1959 through 1969 apportionments were to be made on the basis of revised estimates approved by resolution of both houses. The successive estimate procedure was a self-correcting process whereby previous inaccuracies in a States' estimate

would be compensated such that each State had the funds to complete the System in the final year of the Program.

The differences of opinion were resolved in a compromise. Apportionments for fiscal years 1957, 1958 and 1959 were to be on the basis of the 1954 Interstate empirical formula of two-thirds population, one-sixth area and one-sixth mileage of rural delivery and star routes of each States in ratio to that of all States. Apportionments for subsequent years were to be based upon revised estimates of cost to complete the System developed by the individual State in cooperation with the Bureau of Public Roads.

During the first three years of the accelerated Interstate Program, the apportionments were unrelated to the needs. This resulted in a poor showing in the use of funds and in the completion of Interstate mileage. Several years would pass before these maladjustments were ironed out by allocations according to successive cost completion estimates.

Congress specified that geometric and construction standards be adopted for the Interstate System and approved by the Secretary of Commerce in cooperation with the State highway departments. Congress further stated that the standards should be adequate for the completed Interstate System to accommodate the types and volumes of traffic forecast for 1975. This year was used because the bill leading to the 1956 Act was written in 1955, and twenty years from the date of construction was the commonly used design year. Recognizing the limitation of a fixed design year in a long continuing program, Congress subsequently revised the requirement to twenty years from the date of construction plan approval. Uniformly applied design standards were necessary to assure equity in the needs formula method of apportioning funds between the states. The Federal Aid Highway Act of 1956 called for the first completion cost estimate by February 1, 1959. Subsequent highway acts specified the dates that successive estimates were to be presented to Congress.

Federal Share. The States were traditionally required to match federal aid on a 50-50 basis, except for concessions to States with large areas of Federal land. In 1954 the matching requirement for the Interstate System was changed to 60 percent Federal - 40 percent State in light of the national importance of the Interstate System. In line with the recommendations of the President's Advisory Committee on a National Highway Program, the Federal Aid Highway Act of 1956 increased the Federal share to ninety percent of the total Interstate cost plus a portion of the remaining ten percent of such cost in any State containing unappropriated and unreserved public lands or nontaxable Indian lands exceeding five percent of the total area of the State, but not more than 95 percent of the total cost of such an Interstate project. In effect, the matching requirement for the Interstate System was now ninety percent Federal - ten percent State.

Use of Funds. The 1956 Act authorized the appropriation of \$24.825 billion for the Interstate System over its thirteen year life. With the \$175 million already appropriated by the 1954 Act, a total of \$25 billion was appropriated for the Interstate System as recommended by the President's Advisory Committee on a National Highway Program in the study A 10-year National Highway Program. Subsequent highway acts would increase and modify the apportionments over the life of the Interstate Program.

Congress set forth several conditions on the use of Interstate funds. As was true of apportionments for the other systems, Interstate funds would be available for expenditure for two years after the fiscal year for which it was apportioned. If unexpended at the end of two fiscal years, the funds would lapse. The lapsed amount could then be reapportioned among other States. States would not be allowed to let the 60-40 funds of the 1954 Act lapse to substitute 90-10 funds of the 1956 Act.

Although States were allowed to transfer twenty percent of the fiscal year apportionment from one Federal Aid System to another, Congress prohibited the diversion of funds from the Interstate System.

In recognition of the fact that States might construct portions of their Interstate System with State funds in advance of the apportionment, the 1956 Act provided for advance construction by arranging for later reimbursement to the State for the Federal share of the cost whenever additional funds were appropriated to that State. The Secretary of Commerce had to approve the plans and specifications before advance construction (as was true of other Interstate projects) and the advance construction project had to conform to Interstate geometric and construction standards. Advance construction would not increase the amount apportioned to any State since the State was reimbursed out of future apportionments. Also, States who undertook advance construction were not to be penalized in the allocation of funds under the completion cost estimate formula.

Interstate Use Restrictions. Congress prohibited the construction of commercial establishments on the Interstate to assure free competition of highway oriented services and to prevent the deterioration of full-access control on the System. However, air space above or below the facility could be used for parking if it did not interfere with the free flow of traffic. Subsequent laws would expand this provision to allow any public or private use that did not impair the highway. Any additional points of access or egress from the System had to be approved by the Secretary of Commerce. The prohibition of commercial use of the Interstate right-of-way was to apply to all future construction on the Interstate but would not impair the agreements made by State toll road authorities.

To protect the Interstate from excessive loads, Congress prohibited the authorization of appropriations to any State if the Interstate could be lawfully used by vehicles in excess of 18,000 pounds on any one axle, 32,000 pounds on a tandem axle, 73,280 pounds gross weight or ninety-six inches in width or corresponding maximum weights and dimensions permitted for vehicles using public highways of a State in effect on July 1, 1956, whichever was greater. Congress also requested the Bureau of Public Roads to conduct tests determining the maximum desirable dimensions and weights and to report to Congress by March 1, 1959.

Administrative Policy. The 1956 Act did not alter the basic Bureau of Public Roads relationship with the States. The States were responsible for the initiation of all Interstate projects. Although the States determined the location of the Interstate Routes and were responsible for design and construction of the routes, these operations were subject to the approval of the Bureau of Public Roads for both the technical and financial arrangements, as was true of the other Federal aid systems. The States were fully responsible for planning their own Interstate program, for establishing their own construction priorities, and for operating and maintaining the Interstate System.

Congress specifically called for an accelerated highway program because many highways were inadequate to meet the needs of local and interstate commerce and the national and civil defense. The most important objective of the highway program was the completion of the Interstate System, and Congress had requested a progress report by February 1, 1959 to evaluate the highway program. Congress also required the State highway department to certify that a public hearing was held (or the opportunity afforded) to consider the economic effects of highway location for all Federal aid projects involving the bypassing or transversing of an urban

place. This provision was later expanded to cover rural Federal aid projects and to include the consideration of social and environmental effects of highway location. Finally, the Congress enjoined the States to encourage the participation of small business enterprises in the construction of the Interstate System.

Right-of-Way Acquisition. To aid those States without adequate access control legislation or those States having problems acquiring Interstate right-of-way, Congress provided for legislation enabling the Federal government to exercise its power of eminent domain in acquiring right-of-way or access control for an Interstate project if requested by the State. Upon transfer of the land or access control to the State, the State would have to pay its share of the cost for the land or access control as well as its share of the cost of acquiring the land or access control. The Federal cost of acquisition would be deducted from the Federal apportionment of Interstate funds to the State. If the State lacked access control legislation, the Federal government would retain the outer five feet of right-of-way to control access until the State passed access control legislation. Whenever right-of-way, including access control, for the Interstate System is required over Federal land, an agreement must be concluded between the State and Secretary.

Because advance acquisition saves funds, reduces relocation hardships and permits more orderly acquisition, the 1956 Act authorized the use of a State's apportionment for advanced right-of-way acquisition, provided actual construction followed within five years. The Federal Aid Highway Act of 1959 extended the limitation to seven years. The funds advanced at the request of the State were placed in a revolving trust fund. When the Federal government received vouchers from the State verifying the purchase of right-of-way and commencement of construction, the funds were disbursed.

The advance from a State's apportionment was limited to a maximum of one-quarter of the apportionment for a particular year. The revolving fund would not alter the Federal share of the project cost nor alter the Interstate apportionment to the State on the basis of need.

Inclusion of Toll Roads in the Interstate System. In the Federal Aid Highway Act of 1956 Congress authorized the Secretary to approve as a part of the Interstate System any toll road, bridge or tunnel, now or hereafter constructed which meets the standards adopted for the improvement of projects located on the Interstate System, when such toll road, bridge or tunnel is located on a route heretofore or hereafter designated as part of the Interstate System.⁴ In 1968, a provision prohibited the construction of a toll road on the Interstate System after June 30, 1968; however, the Secretary could approve the construction of a toll road on the Interstate System if the construction as a toll road rather than a free road was in the public interest.

No Federal funds could be used for the construction of a toll facility except under special circumstances. Federal funds could be used on approaches to toll facilities as long as the project had some use other than as a toll road approach facility. For the Interstate System, Interstate funds could be used on approaches to toll facilities although the project had no use other than as an approach to the toll road, provided that the toll road would become free when the bonds were liquidated and that reasonably satisfactory alternative free routes were available to traffic wishing to bypass the toll portion of the Interstate. The Federal Aid Highway Act of 1970 allowed Federal participation in the reconstruction and improvement of any two-lane toll road (which was designated as part of the Interstate System on or before June 30, 1968) to the geometric and construction standards of the Interstate provided that no additional indebtedness was incurred, that

the tolls less the actual cost of operation and maintenance were applied to the repayment of the bonds, and that the toll road became free once the bonds were liquidated.

On the recommendations of the States, 2,102 miles of existing toll road (including the 157-mile Indiana Toll Road) were included in the Interstate System as of August 21, 1957.

Reimbursement for Completed Interstate Sections. Sharp controversy developed over the question of reimbursing the States for Interstate projects (toll or free) built with less than ninety per cent Federal aid funds. The House bill recommended reimbursement to the States for sections of the Interstate built to Interstate standards so that States with good highway programs would not be penalized. On the other hand the Senate felt that the States who had built sections of the Interstate prior to the new matching fund ratio were deriving benefits from these routes because of their construction and should not be reimbursed. In the Act of 1956, Congress deferred the whole matter.

As requested by the 1956 Act, the Bureau of Public Roads with the cooperation of the States reported to Congress on January 7, 1958 on the matter of reimbursing the States for highways completed or under construction on the Interstate System between August 2, 1947 and June 30, 1957. Of the 38,548 miles of approved detailed locations of the Interstate System, as of September of 1957, only 10,859 miles met the criteria for consideration for reimbursement. To be considered, the sections of highway had to be in reasonable compliance with Interstate standards. It would be economically unsound to construct a new highway so close to one already in existence which was deficient to a small degree according to Interstate standards.

The mileage under consideration included 1,950 miles of toll road in twenty-six States and 8,909 miles of free road in forty-seven States of which only 1,955 miles were fully

completed. The total cost of the highways eligible for reimbursement amounted to \$6.09 billion, with \$2.59 billion for toll roads and \$3.5 billion for free roads. Federal aid funds had been used for thirty-two percent of the latter. Thirty-seven percent of the cost was for work under construction or awarded for construction on June 30, 1957; thirty percent of the cost was for work completed for less than two years; and thirty-three percent of the cost represented work completed for two to ten years. Considering depreciation, the cost of reimbursement amounted to \$5.92 billion.

Since the presentation of the reimbursement study, several bills have been introduced in the Congress, and many hearings have been held. "The bills generally have proposed reimbursing the States with an amount of money or system mileage equivalent to the cost of the State built toll and free sections incorporated in the Interstate System."⁵ Under these reimbursement plans, the toll roads would remain part of the system and would continue to operate as toll roads until the bonds were liquidated; Federal money would not be used for bond retirement since the reimbursement money could only be spent for the construction of other highways. However, Congress has never taken action on reimbursement. Its members have felt that the planned Interstate System should be completed first before reimbursement was considered. Financing the reimbursement was also a major problem in any reimbursement plan because no funds were available in the Federal Highway Trust Fund for that purpose.

Other Provisions. The Federal Aid Highway Act of 1956 extended the minimum wage requirements to all Interstate Projects as set forth in the Davis-Bacon Act. The Davis-Bacon Act was later extended to all Federal aid highway projects. In the 1956 Act, Federal funds could be used to reimburse a State for utility relocation costs which the State had to pay under its own laws and for archaeological

and palenotological salvage. The 1956 Act also expanded the Interstate length limitation by 1000 miles because of the need for circumferentials in urban areas.

Subsequent Federal highway acts added new regulations, standards and requirements to the Interstate. These are described in the evolution of policies and standards in the next chapter.

Indiana Motor Vehicle Fund

When the Indiana State Highway Commission was created in 1917, operating revenue was derived from inheritance and the General Fund of the State. The new Indiana Highway Act of 1919 required that all funds collected from motor vehicle registrations and licenses were to be used for highway development. In 1923 the legislative enacted the first gasoline tax law providing for a tax of two cents per gallon. The revenue from the gas tax proved to be insufficient, and the tax was raised to three cents per gallon in 1925. In 1929, the gasoline tax was raised to four cents per gallon with three-fourths of the revenue going to the Indiana State Highway Commission and one-fourth to the counties and cities. An apportionment act in 1932 reduced the Indiana State Highway Commission share to one half.

All highway related taxes (registration and licenses fees, fuel taxes, weight taxes, etc.) were consolidated in a single account in 1937, creating the Indiana Motor Vehicle Highway Account. This account was similar to the Federal Highway Trust Fund in some aspects. After deducting the expenses of collection, a small portion to police highways, the diversion of \$1,250,000 to the State General Fund and \$2,000,000 which went to cities and towns, one-third of the remainder went to the counties; and the balance went to the Indiana State Highway Commission. Legislation in 1941 continued to devert \$1,250,000 to the State General Fund,

increased the share of the cities and towns to \$3,000,000, allocated \$12,200,000 to the counties, and appropriated the remainder to the Indiana State Highway Commission..

With the advent of gasoline rationing during the Second World War, revenues began to drop, and the diversion to the State General Fund was stopped in 1943. When revenues were insufficient to continue operations, emergency legislation was enacted in 1945 to provide monies from the General Fund. This legislation was repealed in 1947 after the crisis.

The current formula for allocating revenues from the Motor Vehicle Highway Account was enacted in 1949. After the expenses of collection and an operating cost of the State Police Department are deducted, the Indiana State Highway Commission received fifty-three percent; the counties, thirty-two percent; and the cities and towns, fifteen percent.

When the Interstate Program began in 1956, Indiana lacked sufficient funds to match the Federal authorizations. Not until the State gas tax was raised to six cents per gallon in 1957 was Indiana able to obligate a substantial portion of the Interstate apportionments. Because the Interstate Program brought about a dramatic increase in the level of operations, the low level of funding and operations prior to 1956 resulted in a slow start on the Indiana Interstate Program. Since 1957, Indiana has had sufficient matching funds to obligate the Federal aid apportionments.

Currently, the State gasoline tax for Indiana is six cents plus a two-cent per gallon bonus tax, and the Federal gasoline tax is four cents per gallon. The two-cent per gallon bonus tax was enacted for the "Killer Highway" Program. Fifty-five percent of the bonus tax goes to the Indiana State Highway Commission and forty-five percent to the Arterial Road and Street Board. The Indiana State Highway Commission has utilized its share of the bonus tax to dual lane the major inter-urban routes of the State, such as US41, SR37, US31, US30, US24, SR63 and other major highways.

Notes

1. Federal-Aid Highway Act of 1956, Senate Report No. 1965, 84th Congress, 2nd Session (Washington, D. C.: U.S. Government Printing Office; May 10, 1956), p. 2.
2. Laws Relating to Federal Aid in Construction of Roads (Washington D. C.: U.S. Government Printing Office, 1971), p. 220.
3. Federal-Aid Highway Act of 1956, Senate Report No. 1965, p. 3.
4. United States Code, Title 23 - Highways, Section 129(b) (Washington, D. C.: U.S. Government Printing Office, 1970) p. 6010.
5. American Association of State Highway Officials, The First Fifty Years, 1914-1964 (Washington, D. C.: AASHO, 1965), p. 191.

COVER DESIGN BY ALDO GIORGINI